RAILROAD GAZETTE

FRIDAY, SEPTEMBER 28, 1894.

CONTENTS

	PAGE
ILLUSTRATIONS:	
American Highway Crossing Signal	660
Stiffening Box Car Ends	661
Fluid Pressure Reversing Gear for Locomotive Engines	661
Boiler Flue Cleaner	663
New Locomotive a Bec, P. L. & M. R. R., France	663
Artillery for the Locomotive Repair Shop	664
Salveter's Central Steel Draft Gear	664
Notes on Instruments for Testing Bridges	665
Ice Plow Worked by Air	666
CONTRIBUTIONS:	
Address of the M. C. B. Association	659
The Bridges of the Bombay, Baroda & Central Railway	659
Comparative Tests of English and American Railroad Trains	659
EDITORIALS:	
Fair Dealing with Employes	668
Some Economic Features of Locomotive Evolution	668
Ventilation of Passenger Cars	669
The Evolution of the Railroad Club	670
Annual Reports	670
Editorial Notes	668, 670
New Publications	671
Trade Catalogues	671
GENERAL NEWS:	
Locomotive Building	672
Car Building	672
Bridge Building	672
Meetings and Announcements	673
Personal	673
Elections and Appointments	674
Railroad Construction	674
General Railroad News	675
Traffic	676
MISCELLANEOUS:	
Technical	672
The Scrap Heap	672
Recent Improvements in Cable Traction	659
Shop Notes—Chicago, Milwaukee & St. Paul R. R.	661
A Locomotive Load	663
New York Street Railway Association	663
Track Elevation in Chicago	663
The Blackwall Tunnel	664
Heavy Engines on Light Grades	665
The Critical Side of Mechanical Training	666
Smoke Prevention in Chicago	667
Manchester Ship Canal	672

Contributions.

The Address of the Master Car Builders' Association.

The Master Car Builders' Association—Office of Secretary.

CHICAGO, Ill., September 24, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I observe your notice of the Proceedings of the Master Car Builders' Association of 1894, consisting mainly of a protest on account of the name and address of the Secretary not appearing on the title page or the page next to it. You err in attributing this to "modesty" of the Secretary; it is his judgment which is at fault, if fault there be.

The Master Car Builders' Association is not organized nor run for the benefit of others; it is extremely selfish, and the Proceedings are published primarily for the use of the members, who not only know the name and address of the Secretary, but know where to find it if they should forget either.

It is true we sell the Proceedings to others interested, but we are not organized for that purpose, and we do not seek unlimited correspondence with non-members. Should courtesy require you to reply for one month to the letters received at this office about car couplers of no value and other what-nots, you might revise your own judgment on the point in question.

JNO. W. CLOUD, *Secretary.*

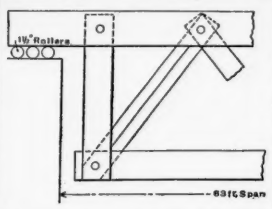
[Yes, we admit the selfishness, but put yourselves in the editor's place, and try to imagine the time that he must lose telling people where the M. C. B. Association is and what its Proceedings are sold for. And who pays him for that time and trouble?—EDITOR RAILROAD GAZETTE.]

The Bridges of the Bombay, Baroda and Central India.

CALCUTTA, Aug. 19, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

There is yet balm in Gilead for the owners of rotten bridges as you will discover from the remarks of General Trevor, R. E., C. S. I., Chairman of the Bombay, Baroda & Central India Railway, which you will see reported in *Indian Engineering* and in other newspapers from this country. Some of the quaint and trustful remarks of the General are worth reading. He says, for instance, concerning their girders: "They were not a first-class job in workmanship or design when first put up, and lately cracks have been found in some tension bars. . . The cracks, it is believed, are old, not improbably having occurred principally when the girders were in course of erection, and *are not practically in any appreciable degree dangerous*, though unpleasant to look at when detected, for the cracked bars are removed as soon as they are discovered. . . It cannot be asserted, I may safely say, on any proved ground, *that the danger of collapse is any greater now than it has been during the last thirty years.*" The italics are my own. The bars of which he speaks are the chord bars and you may judge what a valuable contribution this is to engineering science. These girders were designed by Colonel Kennedy, R. E., and I send you a sketch showing the mode of support. They are through bridges, on screw piles, 5 ft. 6 in. in gage. The chord bars are bursting because they are ordinary flat bars cut off close behind the pins, which are also too small. There must be quite 17 tons to the square inch on the bearings of the pins. Surely America ought to get one of these bridges as a curiosity to console that country for not having R. E. Board of Trade Inspectors to look after their railroads.



General Trevor was head of the Indian Public Works Department and was once Government Inspector on the line of which he is now Chairman, so that these opinions coming from him lead one to doubt seriously whether government inspection of British railways is anything more than a farce, at least when conducted as it appears to be by the Royal Engineers.

Of course you know something of the jealousy which exists in this country between the civil engineers and the Royal Engineers because of the way in which the latter monopolize the best appointments, and surely General Trevor in this case has very seriously injured the standing of the corps. He has gone very far to confirm the accusation so often brought that the Royal Engineers have very feeble qualifications for the civil appointments which they receive, and he has given us a beautiful illustration of the worst aspect of bureaucratic administration; that is, its dull pig-headedness and self-sufficiency. I do not say that these qualities pertain to the Royal Engineers any more than to any other body of men; but that they are very apt to be highly developed in bureau officials; and the whole episode is another warning to people not to let their private affairs drift into the hands of government officers.

A CHIEF ENGINEER.

Comparative Tests of English and American Railroad Trains.

GOULBURN, New South Wales, July 30, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read with great interest the account of the comparative tests of English and American railroad trains, and the somewhat unexpected results obtained as to the relative train resistance of the English and American trains in your issue of March 30, 1894.

The tests point to the fact that the resistance of the English train averaged 6.00 lbs. per ton of 2,000 lbs., and the American train averaged 3.51 lbs. per ton of 2,000 lbs., the variation in the two cases being from 5.08 to 6.62 in the case of the English train, and from 1.73 to 5.67 in the case of the American train. The larger variation in the American train resistance is probably due to curvature, as curves up to seven degrees appear to exist on the American road, against a maximum of probably not more than 2½ degrees on the English road.

My object in writing this is to point out what appears to me to be the only probable solution of the question of how it is that the American train gave so much lower resistance than the English, with a view of having the matter fully discussed in your paper.

The fact that the English train was supported on 130 axles against only 109 axles under the American train, may account for some of the difference, but not a great deal; and again the use of spoked wheels by the English train, against the use of chilled, disc wheels by the American train, may account for a little extra resistance, due to the action of the air among the spokes, but this can only be very trifling. But after careful consideration I have come to the conclusion that the main factor in the problem is this: The English practice is to lay their rails with an inclination inwards of 1 in 20 and to cone their wheel-treads at the same angle, the American practice being to lay their rails level, and to give but very little coning to their wheel-treads. Now from observation I find that the effect of wear on the inclined rails and coned wheel-treads is to cause the wheel-treads to wear approximately to the shape of the rail-head, but the surface of the wheel-tread in contact with the rail still maintains the conical form.

With the American system of laying the rails level and giving but little coning to the wheel-tread, after a moderate amount of wear the wheel-tread must approximate to a cylindrical form. Now as to the action of a coned wheel on a straight road, any one who has watched the motion of an English four-wheeled wagon must have noticed that its forward motion is accompanied with constant oscillation from side to side even on very good roads, caused by the action of the coned wheels. This oscillation must account for a considerable amount of power expended in hauling the train. But this is not the only point where power is wasted by coning, for, as stated above, the tread of the wheel after a little wear tends to take a bearing on the whole width of the worn rail-head with the result that as there can only be one section of the cones rotating at the velocity due to the forward motion of the train, all other sections of the cone in contact with the rail must be rotating at a speed greater or less than the speed due to the forward motion, or in other words that there is a constant slipping action going on between the wheel and rail, which slipping action (due to the varying diameters of the various points of contact with the rail) must absorb a very considerable amount of power, and, in the main, account for the great difference in resistance of the two trains under consideration.

If the above supposition is correct, it follows that with wheel-treads approximately cylindrical and wide-headed rails laid level, we may expect a very great reduction in train resistance as compared with coned wheel-treads and rails laid at an angle, and we might also expect steadier running and a longer life to the wheel-treads (or tires).

Another point in connection with this question of coning is the probability that a locomotive with coned wheel treads on rails inclined inwards would have a greater tendency to slip than one with cylindrical wheel-treads and level rails, as on account of the varying diameters of the points of contact of the wheels with the rails an amount of local slipping must constantly be going on which will probably cause the conditions of adhesion to be more or less unstable when the locomotive is working at its maximum power.

I attach a tracing to illustrate the subject. The tracing suggests to what an extent the tire and rail when worn fit each other and how great the difference in diameter is of various points of contact in the case of coned wheels.

WALTER SHELLSHEAR, *M. Inst. C. E.*

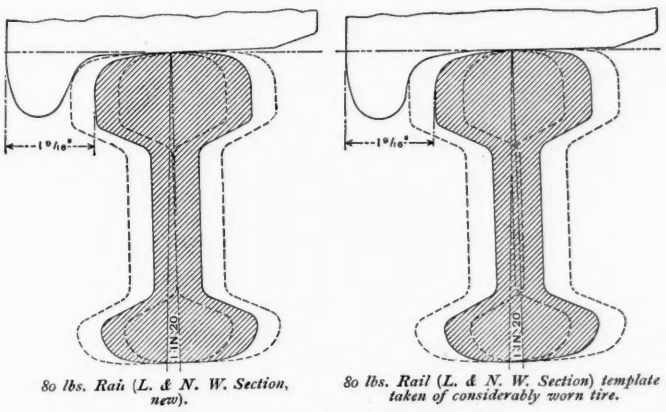
Recent Improvements in Cable Traction.*

BY G. W. M'NULTY, M. AM. SOC. C. E.
Chief Engineer Metropolitan Traction Co.

(*Concluded from page 649.*)

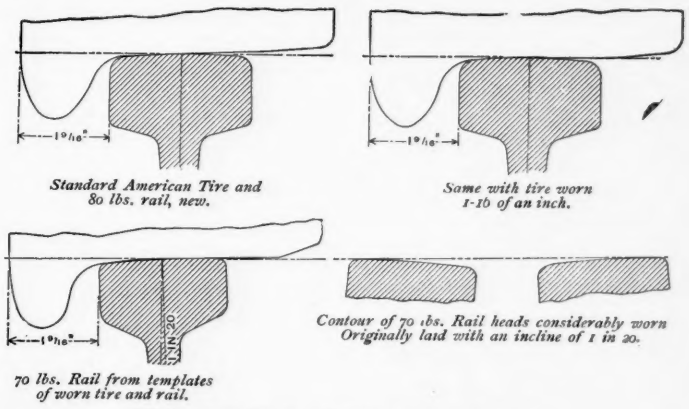
5. *Improvements in Track Work.*—The first and greatest improvement was in the rails, which were especially designed for this road. To simplify the yokes they were made of the same depth, and for convenience of paving that depth was made 7 in. In the slot rail to secure a good support for the paving blocks, the web was made vertical, with very satisfactory results. The head of the tram rail was made with a groove just large enough to take the wheel flanges and enable them to crowd out the dirt, but too small to permit a wagon tire to catch in it. The flange was 5 in. wide, and contained enough metal to bring the vertical axis down to pretty near the center of depth, thus giving a very efficient girder section. The joint was made by a combination of a pair of four-hole splice plates, with a McConway & Torley clamp, the former taking the trans-

*A paper read before the Syracuse Convention of the Street Railway Association of New York.



80 lbs. Rail (L. & N. W. Section, new). *80 lbs. Rail (L. & N. W. Section) template taken of considerably worn tire.*

80 lbs Rail, London & North Western.



Standard American Tire and 80 lbs. rail, new. *Same with tire worn 1-16 of an inch.* *70 lbs. Rail from templates of worn tire and rail.* *Contour of 70 lbs. Rail heads considerably worn Originally laid with an incline of 1 in 20.*

70 lbs. and 80 lbs. T Rails, new and worn.

verse and the latter the shearing stress and together making a very effective joint. Owing to lugs on the yokes, and to the tie rods supporing the slot rail being half way between the yokes, the tram rail joints had to be one-quarter of a yoke space, or 13½ in., away from the yoke center, being thus not exactly suspended or supported. The result was satisfactory.

The substructure presents some very novel features. Stout cast iron yokes were used wherever practicable, primarily of three standard types, namely, for straight track, surface crossings and curves, the latter weighing nearly twice as much as the others. Some modifications of these had to be made in complicated structures, but the number of special cast yokes was kept as small as possible, special wrought iron yokes being used in all difficult constructions. In fact, throughout the entire work all details were standardized wherever practicable. In the surface crossings, for instance, a typical structure was designed for a square crossing, and crossings of any other style or combination of sizes on double tracks were made by a slight change in the details, for which no special drawing was required. Crossing yokes were made flush on top and kept low enough to permit the use of heavy sole plates under the rails. A number of holes cored in the top flange of the yokes permitted the secure attachment of the sole plates in almost any position. In this, as in other special constructions, the perpendicular web of the slot rail greatly facilitated all attachments thereto.

Cable crossings, which for sake of distinction were called intersection, were provided for at Twenty-third street and at Sixth avenue, but fortunately their use has not been required. With the possible exception of fenders, perhaps no other subject received so much attention from the noble army of inventors as did the cable crossings. We planned, however, where a cable had to be dropped, to simply "float" over, which our experience at Houston street shows to be always easily practicable at the points mentioned. With an automatic release, to be described later, and an automatic gypsy, as before noted, the whole problem, both of construction and operation, at cable intersections becomes very simple.

Crossovers from one track to another were always made with wrought iron yokes. They presented no other novel features.

Surface turnouts were made with tongue switches in place of run-offs, to secure better support for the wheels, and most of the latter tongues were secured by a locking pin that could be readily withdrawn from the surface, so that the tongue could be easily removed and replaced without disturbing the pavement.

In cable turnouts, of course, the slot switch was the most difficult problem, but it was very satisfactorily solved by making the point of the tongue stationary and throwing the grip shank into the proper slot by movable pieces working under the head of the slot rail, or in special boxes, and arranged to support the slot tongue when at rest. Of course the slot and track switches were connected so as to work together, and no case has yet occurred where the grip has taken the wrong slot. They have also stood up very well under the heavy traffic of lower Broadway, which, it may be remarked, is often more destructive to track work than the cable cars themselves.

Before coming to the curves the carriers should be mentioned, since, though possessing no very novel features, they have worked very satisfactorily. To save journal friction and especially to reduce the slip, which occurs when the cable first touches the carrier after having been lifted off by the grip, and which by its multitudinous repetition becomes a serious source of wear, they were made as light as possible. They were cast with solid arms and heavy chills. As with the duplex system, each carrier had to be one side of the center of the conduit; the size of the shaft bearings was made proportional to the weight they carried so as to secure uniformity of wear. Both bearings were contained in one bracket so as to insure proper position and alignment, and each bracket secured from slipping by steady pins, rested on an angle iron frame at three points only so as to prevent shattering.

Curve construction is the most serious problem of cable roads. It is probable but for the curves there would be a dozen cable roads where there is now only one, but to have to go fast where you ought to go slow, to be in constant danger of having your cable stranded if a careless or rattled gripman opens his grip ever so little, and to have to put a whole machine shop under ground at every change of alignment, are such serious, and, so far, unsurmountable evils, that it argues much for the inherent merits of the cable road that they have not discredited it altogether. It must be confessed that there are no good curve constructions; some are less bad than others, that is all, and even the least objectionable are vastly complicated by the duplex system. That used in the Broadway road was as simple as any, and, as curve constructions go, has worked very well. Two sheaves, one for each cable, are carried in a frame secured between adjacent yokes so that it can be readily removed for repairs or renewals. Indeed some such arrangement was necessitated by the fact that we had to put the curve construction in the street before the curve mechanism was fairly designed, so that provision for its subsequent addition had to be made. This is a fair illustration of the conditions, probably too painfully familiar to most of you, under which such work is often, if not usually, performed; the drawing room struggling hard to keep up with work already done, instead of having complete and harmonious plans prepared in advance, and the engineer expected to achieve just as satisfactory results as if sufficient time had been allowed him to see the end from the beginning and plan accordingly. In the present case circumstances more than individuals were responsible for the unfortunate conditions.

In order to get the wheels on separate shafts instead of on the same pin, it was necessary to stagger them, as they could not be far apart vertically. In this way either sheave could be removed while the other was running. Lubrication was effected through pipes, the soft grease being forced from the reservoir from a weighted plunger. An angle iron guide, bolted to the yokes in short lengths, took the side pressure of the grip, while the edge of a flat bar, extending in sections between the sheaves for the whole length of the curve, guided each cable into its proper place. To get the cable started on the right side of this bar at the entrance of each curve, a so-called "flipper" was employed. This was a novel feature, and deserves a moment's notice. It really was an extension of the flat bar or cable guide above mentioned, having a partial rotation on an axis parallel to the adjacent tangent. It was projected into the conduit between the cables, being kept out by a spring which permitted it to recede while the grip passed, but held it closely in contact therewith at a point between the cables so that the inner cable was kept above it and the outer one below, thus preventing the live cable from riding on the dead one, which would have done serious mischief. As a moving part kept in place by a spring and struck with some force by the passing grips many hundred times a day, it was adopted with some reluctance, but its action has proved very satisfactory.

6. *Improvement in Cars.*—While the grip is the fundamental feature of the car, and, therefore, comes logically under this head, it is also the heart of the cable road as far as its design is concerned, the nucleus around which all the rest of the structure aggregates and the ultimate factor of the whole work. It may be said in planning any machine or structure—and a cable road is both—that part which is most closely controlled by the conditions of the problem to be solved should be first designed. The essential condition of the cable road problem is that there must be some means by which a street car can grasp or release at will a moving cable. The street car and the moving cable are simple problems taken separately. The difficulty lies in their combination; in a cable road it is the grip which effects that combination, and it follows that in planning a cable road the grip should be first selected or designed; and all other parts so arranged as to secure its highest efficiency. Unfortunately, in the Broadway road through a peculiar combination of circumstances, which need not now be rehearsed, the grip was not fully designed until the road was nearly completed. This necessarily much complicated the design of the conduit and its attachments, as provision had to be made for some possible conditions of the grip which were afterwards found to be unnecessary, while the design of the grip was hampered by the development of unforseen conditions for which the conduit as built did not adequately provide. Fortunately, by much patient study and some experimenting, it was found possible to devise a very satisfactory grip, whose more important features will be briefly described.

First. As it had to be able to take a rope on either side and go either end first, the grip was necessarily quadrisymmetrical in plan, with, of course, a pair of jaws on each side, both pairs moving together. Contrary to the more common practice, the lower jaws remain stationary. This was done partly to reduce the depth of the conduit, which on Broadway was a most important consideration, but more especially to reduce the slip of the cable on the carriers as it trails from the grip. This, as before noted, is in the aggregate a serious source of wear to both cable and carrier, and its amount in each case is obviously in direct proportion to the length of time that the two are out of contact, which in turn is approximately proportioned to the height that the cable is lifted by the grip. The jaws are lined by steel dies rolled from rail billets, which have given very good results. The shanks were of structural steel, and have also done well. At the end of each cable section, and also in case of prolonged stops, it is necessary that the gripman should be able to drop the cable altogether. Suitable provision was made for this, but it was early foreseen that it was not safe to place entire dependence on the gripman's care, whose attention was liable to be distracted at the critical moment, and whose neglect was certain to wreck the grip if it did not strand or break the cable. An automatic trip was therefore added, actuated by inclined projections in the conduit, which ensure the release of the cable at all desired points.

Some of the grips first supplied did not have this device, and its value was abundantly demonstrated by the accidents which occurred through lack of it. As several devices have been proposed whereby the grip can be made to pick up the cable at any point, a feature at first sight of much value, it may be worth while to say first, that where cars are run on such short headway as on the Broadway road, should it be lost, it will be but a fraction of a minute before the following car will be ready to push the temporarily disabled one to the next gypsy, where the cable can be regained. Next, to permit the jaw to get under the cable at all points, would require either a deeper conduit than was practicable in view of the underground obstructions on Broadway, or, much more, cleaning of the same. Last, but not least, all carriers would have to be carefully protected from damage by the grip, a matter of considerable expense and one which would seriously interfere with keeping the conduit clean. Concentric wheels were used for operating both grip and brake as requiring less room for their operation and permitting greater range of motion and consequently power, and a more delicate manipulation of the grip when "stealing" or running slower than the cable, as is so very often necessary on lower Broadway. They are for these reasons easier for the gripmen, and hence preferred by them. While not quite so prompt as the lever, no trouble from that source has been experienced, and the starting and stopping of the car is less jerky.

The brakes offer no special features. Some air-brakes have been tried with satisfactory results, but the advantage has not been sufficiently marked to warrant their general adoption.

The cars have been lighted with compressed gas on the Pintsch system, which has proved very satisfactory, and is believed to have been here used for the first time in street cars.

The heating question has received very careful attention, and several tests of different systems have been made. Some method of hot water storage has promised the best results, but the difficulty of charging on such short headway would be very great, and the experience of one winter would seem to prove that with a road carrying so few long trip passenegrs heated cars are not necessary.

7. *Improvements in Car Barns, etc.*—An extensive and elaborate structure for the storage of cars has been very carefully designed, but has not yet been erected. Its dimensions will be about 200x600 ft. by 100 ft. high. Its most noticeable feature will be a combined transfer turn table now partly installed, and designed to be operated by electricity, but at present moved by hand gearing. To handle cars in and out of the barn, it is proposed to use two or three small motors driven by storage batteries, compressed air or superheated water. To bring out a car, the motor goes after it, and brings it out to the transfer turntable near the front of the building. This not only shifts it to the proper track to run out, but, rotating 100 degrees, puts the motor in position to push the car out onto the line and come back for the next one without switching. Of course, in running cars in, the operations are exactly reversed and the turntable then prevents the motor from being shut in by the car it has handled.

On the upper floors plain transfer tables traverse the center of the building, connecting with a car elevator at each side, while smaller motors or lazy ropes would handle the cars on the floor tracks. Turntables would not be required here, as, if lazy ropes were not used, the motor belonging to the floor could always be placed near the transfer table opposite the track onto which the next car was to be run.

There are necessarily some complications of track work in front of the car barn, and all switches there are operated by one man in an elevated cab overlooking the whole street at that point, which has proved a very satisfactory arrangement. Suitable inspection pits and a well-appointed machine shop, equipped not only for the repair, but also for the manufacture of grips when needed, complete the present installations at the car barn.

One difficulty, ascertained in the construction of the Broadway road, can never exist to a like extent elsewhere. I allude to the underground obstructions, of subways, gas, water and steam pipes, pneumatic tubes, sewers and other matters too numerous to mention, which had accumulated in three centuries of the growth of a vast metropolis. Their removal alone would have been a formidable task, but as almost all of them had to be kept in use while the removal was going on, and the street traffic had to be continued as well, the writer is inclined to look back on this part of the work with a feeling akin to astonishment at its successful accomplishment in so short a time. To construct and put in running order, through such a labyrinth, a complicated machine five miles in length, to be jointly operated by an army of engineers and gripmen, with reasonable precision and freedom from derangement, is an achievement of which any corporation may well be proud.

American Highway Crossing Signal.

The American Signal Co., 100 West Fayette street, Baltimore, Md., is now offering its automatic alarm signal for road crossings, which has been tested by five years' service and is claimed to excel in simplicity of construction and cheapness of operation. The manufacturers state that the freedom from necessity for repairs is a strong point in favor of this signal and that it can be relied upon for effective service for a long term of years. The motive power is a battery of eight Edison-Lalande jars holding one gallon each. This battery will work where the temperature is 50 degrees below zero and it has been used six months at a time without renewal. The track instrument is placed in a box only 3 in. x 8 in. x 15 in., so that it can be attached to an ordinary sleeper or even placed on a bridge or in the middle of a street.

The principal apparatus is placed in a box fixed to a post 8 in. square and about 16 ft. high. This box, with the door open, is shown in fig. 1. When the circuit is closed by an approaching train, the electro magnet, H, in the upper part of the box, is energized, and its armature, G, is attracted. This lifts a detent, I, raising a hook out of a notch in the drum, K, leaving the latter free to revolve. The detent, I, is held up by spring, L, until it is released by a trip pin, M, fixed at the proper point on the periphery of K, when it again falls upon the drum, K. The closing of the circuit through magnet H also releases contact plate, N, which falls to O, thereby closing a circuit from the battery to electro magnet P, in the bottom of the box, which operates the bell and also the ratchet pawl, Q. This ratchet, by means of an intermediate pinion, revolves the drum K, which regulates the time during which the bell shall continue ringing. (This time can be adjusted from 10 seconds to three minutes.) As long as detent I rests on the drum it holds armature G closed, and thus keeps N and O connected, and the bell ringing. When the drum, K, and its wheel, R, have made a complete revolution, the hook on detent I will fall into the notch and the bell will stop ringing. If, just before the wheel, R, has completed a revolution, another train should approach on another track, electromagnet H would hold up I, causing the wheel to make a second revolution, and continuing the alarm twice as long.

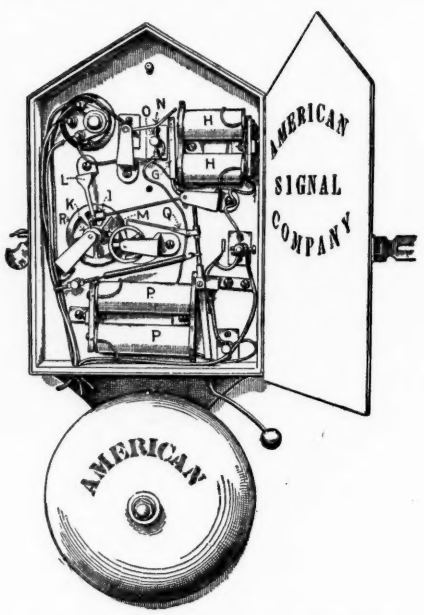


Fig. 1.—American Highway Crossing Signal.

The track instrument or circuit closer, to be placed at any desired distance from the crossing, is shown in fig. 2. For a single track road there are two concussion bars to be depressed by the wheels, A and B, which, when depressed in the reverse order, by a train running away from the crossing, lock the circuit closer so as not to operate the signal. A train approacing the crossing (running from right to left) first depresses bar B; this depresses lever C, which releases latch E and causes it to pass under the end of the mercury tube F; next bar A is depressed, which acts on lever D, tilts tube F, allowing the mercury within to flow to the other end and close the

circuit. When a train runs in the opposite direction latch E is pushed over instead of under the tube and prevents it from being tilted by the action of bar B.

On a double track road where each main track is used by trains running in one direction only, there is but one concussion bar, and the circuit-closing lever is correspondingly simplified.

This instrument is in use upon the following named railroads: Baltimore & Potomac, Baltimore & Harrisburg, Buffalo, Rochester & Pittsburg, Cumberland Valley, Chicago & Alton, Chicago & Grand Trunk, Lehigh & Hudson River, Long Island, Monongahela River, Northern Central, New York, Lake Erie & Western, Philadelphia, Wilmington & Baltimore, Philadelphia & Erie, Western Maryland, Western New York & Pennsylvania.

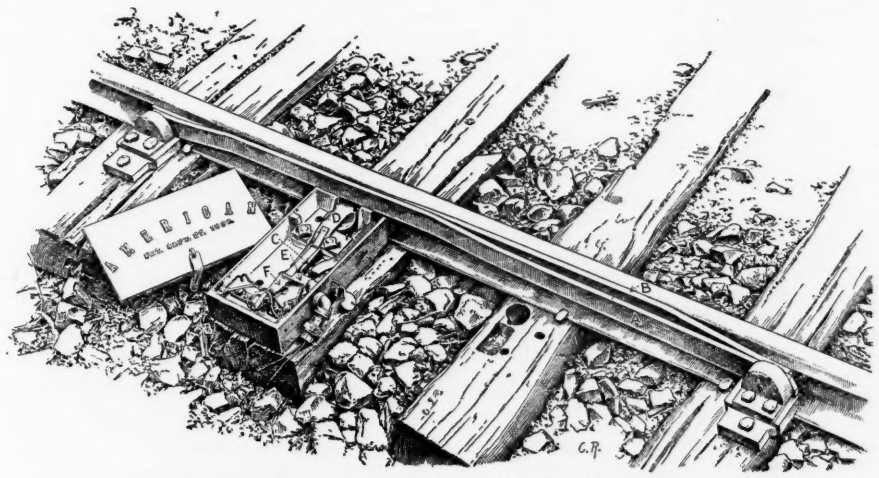


Fig. 2.—Track Instrument for American Highway Crossing Signal.

Shop Notes—Chicago, Milwaukee & St. Paul.

Business is not very lively at the West Milwaukee shops of the Chicago, Milwaukee & St. Paul, although a good force of men is kept at work on general repairs and on improvements in the plant and yards of the company, which will facilitate work when business improves. That part of the yards devoted to scrap piles and miscellaneous stock has apparently received especial attention. The ground has been carefully levelled and staked off into streets and alleys which Mr. Barr has named in honor of his subordinates. All material is carefully assorted and piled, nothing being allowed to project over the lines established. For the smaller material large bins are built on a platform or floor of old car timbers. The bins themselves are built of old flooring and similar material and are about 15 ft. square. Considerable attention has been paid to the matter of utilizing scrap material, with the result that the amount of scrap shipped has been considerably decreased. Old bolts are straightened and if the threads are not in good condition, are cut to a standard length and placed in racks plainly marked with the length and diameter of the bolts which it contains. From these racks the bolts are taken as required, threaded the proper distance and put in service. Rods too short to be used again as rods are straightened, cut to length and headed, and again put into service as bolts. Preparations are now being made to convert short lengths of ¾ in. rods and bolts into track bolts, and all pieces of this size of over 5½ in. in length are being taken from the scrap pile as its contents are removed to the bins provided. Worn-out nuts are also being removed from the scrap heap and will be heated and closed up and tapped for future use. Arrangements are also being made to work up sheet metal of the proper thickness into washers.

The spring plank bearings of swing motion trucks when badly worn are removed, the ends heated, upset, and split, and a small wedge of iron inserted. They are then brought to a welding heat and given the proper form under a cushioned hammer fitted with the necessary dies. Old carrier irons are straightened when not badly worn and new ones made from old arch bars. Broken center pins are straightened, welded up and coupling links, when not too badly bent, are straightened. Old splice-bars are heated and converted into rail braces through the medium of a bulldozer. Various other parts, which are usually scrapped without question, are worked over by Mr. Barr, he having found that the work can easily be done by his force for the difference between the price of scrap iron and the cost of the articles when bought at the market price. He is also able by doing such work in dull times, to have a good force of men on hand when work is plenty.

The repair yard at these shops seems particularly well arranged for the convenient repair of freight cars. Instead of a small number of long tracks through the yard, a greater number of short tracks of different lengths, connecting with a main track are provided, thus making access possible to any car in the yard without disturbing a large number of cars upon which work is being done.

The planing mill connected with the car shops is not large, but is well arranged. The material is brought from the dry kiln on push cars over a track alongside the building, and run into the building to the machine to be used. It is fed to the machine from the push car, and is loaded immediately upon a car without having touched the floor of the shop. The car shops are now working entirely upon repair work, there being no new work in hand, though the shops have a capacity of ten cars a day.

A car board recently erected shows by means of symbols of various forms and colors, the history of all passenger cars on the road, giving the date and place of building, the type and general construction, and the date, place, and amount of repairs.

Compressed air has for some time been employed for cleaning cushions and dusting out cars with the best of results, and arrangements are now being made for its use in cleaning carpets and rugs. Air is also used for other purposes, a number of hoists having been erected and several small portable engines used for various purposes in the machine shop. Arrangements are now being made to substitute some small electric motors for some of the purposes for which air engines and flexible shafts are generally used.

In order to more thoroughly wash the boilers of locomotives a set of special nozzles has recently been devised with which it is possible to reach all parts of the boiler. These nozzles will be shown later.

Bulging of Ends of Box Cars.

At the August meeting of the Southern and Southwestern Railway Club, Mr. S. A. Charpiot, the Secretary, presented the following report:

In addition to what has been published in the minutes of our last meeting in April, on the subject of "Bulging of Ends of Box Cars and Its Remedy," there are more suggestions for construction, which have not been elaborated before the Club. We exhibit the sketches of end framing as illustrated by Mr. Sanderson in figures 1 and 2, showing the weak points of the generally accepted constructions. Fig. 3 shows the proposed improved construction, the main features of which are the reinforcing the center and immediate posts with $\frac{5}{16}$ angle irons 3x1½ in. The top of angle bars on center posts being shaped into a ¾ bolt, running through the top of end plate. The top of angle bars on intermediate posts are twisted to present its broader surface to the plate, to which it is fastened by two bolts.

The 3 in. or broad wing of angle bar is extended below the center and intermediate sills, and terminates into a lip, firmly anchoring the posts to the sills, on which they are placed, and fastening them with two through bolts. The design calls for inside and outside corner bands at middle and top, and tie rods at same location as shown on sketch; the framing of end of car is absolutely disconnected from end sills.

Fig. 4 illustrates another construction, which the mechanical staff of the Norfolk Western Railroad intends to adopt hereafter, and is described in the following letters of Messrs. Sanderson and Soule:

Mr. Sanderson (N. & W.)—We have made up our minds that the best framing we can get up for the ends of box cars will be by using 4-in. eye beams for the posts and braces; these eye beams to be held in castings, top and bottom, which castings will be secured to the end plates and end sills, or longitudinal sills, as the case may require, in the usual way. The plate to be tied to the end sill or longitudinal sills by vertical through bolts, which will lay in the grooves of the eye beams, cross rails to be put in between the eye beams, one about the usual height of the belt rail, and one about half way between this and the floor. These to be 4x4 solid pine sticks, under each of which a long through bolt would run, made tight to the side of the car, keeping these rails to their places, tying the whole car firmly together crossways. The corner posts will be of wood as usual, but made of a heavier section than we have used heretofore. Angle plates used inside and out at the level of the belt rail, and top and bottom corners, the end plates to be secured to each of the longitudinal purlins by the means of long strap bolts. The inside sheathing and the ends can be virtually the same as the outside. In this way we believe we can make a box car end which will stand almost anything.

Mr. Soule (N. & W.)—At Saratoga you asked me to send you some information in reference to or practice in the matter of strengthening the ends of our box cars. We have recently again reviewed this matter, and although we have no drawings to offer, are inclined to suggest that the following ought to be the principal features of an improved construction: Posts and braces made of 3 or 4 in. I-beams, supported in cast pockets top and bottom, with vertical bolts alongside posts. (The posts to be located over longitudinal sills, if possible). Two cross rails or belt rails let into the beam posts. End carlins stronger than now, and bolted to ridge pole and purlins with strap bolts.

In making the sketch, fig. 4, I placed the I-beams forming the upright posts on the end sill, but they could readily be placed on the center D and intermediate sills, same as shown in Fig. 3, and as recommended by Mr. Soule's letter. Of course the designs of the pockets at top and bottom of I-beams can be varied in a multiplicity of shapes and sizes, which have not been elaborated, as this is only a suggestion of construction. In case I-beams should be objectionable, no doubt a construction similar to that shown in Fig. 4 might serve a good purpose and give satisfactory service, composed of wood posts and iron rods. By making the posts, beams and rails not less than 4x4 or 4x5, or even of greater section if need be, with vertical and horizontal cross rods, angle and corner posts, and anchor bolts when needed, we would then get a section of timber strong enough to resist the battering shocks of shifting cargoes. The introduction of post pockets for the posts would give them the full strength of their section, as shown in Fig. 10 of April report. Such a construction might be more readily repaired in case of wrecks, when the members made of metal generally give considerable trouble to straighten and put back in shape.

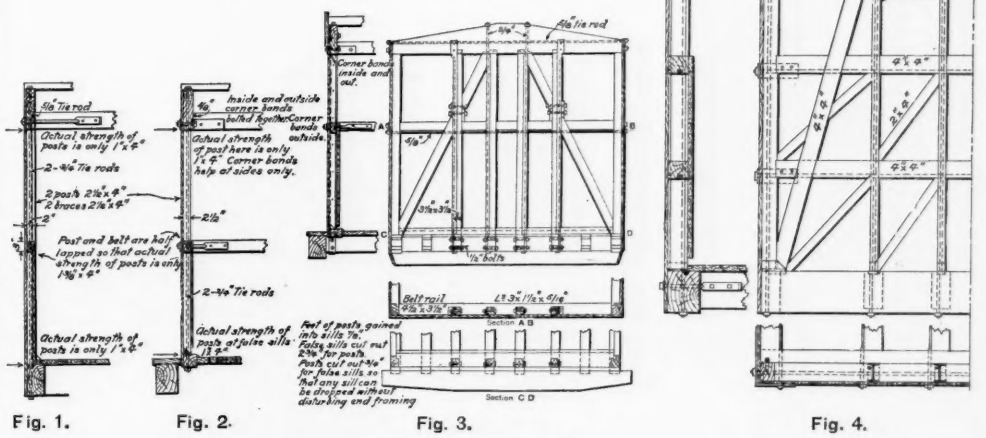

5/8" Tie rod
Actual strength of posts is only 1"x 4"
2-⅝" Tie rods
2 posts 2½"x 9"
2 braces 2½"x 9"
9"
Post and belt are half lapped so that actual strength of posts is only 1⅝" x 9"
Actual strength of posts is only 1"x 4"
⅜" inside and outside corner bands bolted together
Actual strength of post here is only 1"x 9" Corner bands help at sides only.
2½"
2-⅝" Tie rods
Actual strength of posts at false sills 13"
Corner bands inside and out.
5/8" Tie rod
⅜"
⅜"
1⅛" bolts
Belt rail
Section A B
Feet of posts gained into sills ⅞".
False sills cut out 2⅜" for posts.
Posts cut out ⅝" for false sills so that any sill can be dropped without disturbing end framing
Section C D
9" I Beam
4"x 4"
4½ 4"

Fig. 1. Fig. 2. Fig. 3. Fig. 4.

Stiffening Box Car Ends.

A Fluid-Pressure Reversing Gear for Locomotive Engines.*

BY MR DAVID JOY.

Single-Eccentric Valve-Gear.—Ever since his former paper to this Institution in 1880 (Proceedings, page 418) describing the radial valve-gear which he was then introducing, the writer has entertained the idea of a yet simpler and more direct form of reversing and expansion valve-gear than either the radial itself or any other plan hitherto in use. Notwithstanding the success achieved with the radial gear, the difficulties encountered in its introduction convinced him that a better plan was required, and enabled him to see the direction in which to work. From the outset the idea kept prominently in view was that only a single set of pieces of mechanism should be employed, instead of a duplicate set, for actuating the valve from the crank axle, and also for reversing from forward to backward gear; and further, that reversal should be accomplished by the change of position of the gear, as in the radial gear, and not by the addition, as in link gear, of other and distinct parts for backward running. Accordingly the single eccentric with shifting position on the crank axle, as in Dodd's wedge-motion, naturally recommended itself for adoption; while the difficulties and complication involved in any attempt to effect the shifting by mechanical connections through levers, links, screws, or friction gear, which would have been fatal to practical success, led the writer to throw all such expedients aside, and to have recourse to the employment of fluid pressure, by means of oil or

* From advance sheets of the proceedings of the Institution of Mechanical Engineers.

other fluid conveyed through the center of the axle itself for shifting the position of the eccentric. The purpose of the present paper is to describe the construction and working of the fluid-pressure reversing gear designed in conformity with the foregoing ideas, and already in practical use for locomotive running.

The general principle of the oil reversing gear will be readily understood from a comparison of the skeleton diagrams, Figs. 12 and 13, showing the main center lines of the ordinary link gear and of the oil gear. In the

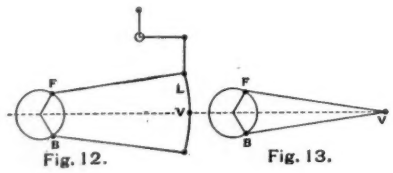


Fig. 12. Fig. 13.

link gear, Fig. 12, with its two eccentrics F and B for forward and backward going respectively, the motion of either is transmitted to the valve spindle V through the motion link L, coupling the outer ends of the two eccentric rods. In the oil gear, Fig. 13, the same result is obtained more correctly and with less than half the number of parts, by employing only a single eccentric, and shifting it transversely across the axle from side to side for forward or backward gear. For this puporse the axle is squared where the eccentric is mounted upon it; and an oblong slot through the eccentric allows it to be slid across from side to side of the axle. In each end of the slot is formed a small cylinder, which works over a corresponding ram fixed on opposite faces of the square on the axle. It only remains to force oil or other liquid under pressure into either end of the axle, and thence into one or other of the two small cylinders, according as it is required to move the eccentric into either position for forward or backward gear, or to hold it between these extremes for any point of expansion or for mid gear. The oil is made to pass into either end of the axle by a small, cylinder placed on the foot-plate of the engine, and fitted with a piston which is moved either by a handwheel and screw or by steam, or by both.

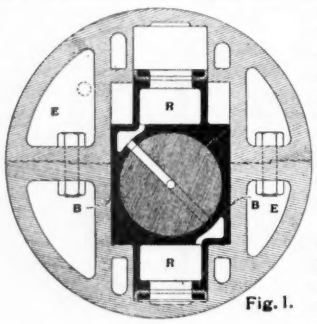


Fig. 1.

The arrangement is shown in the accompaning drawings, Figs. 1 to 5, as adapted for locomotives.

Fig. 1 is a cross section through the crank axle and the square block mounted upon it, on which the eccentric slides. Fig. 2 is a plan showing the square block and the two pairs of rams upon it, with the near halves of the eccentrics removed. Fig. 3 is a longitudinal section through the center line of the axle. Figs. 4 and 5 are cross and longitudinal sections through the axle and block, the latter view being taken diagonally through the corners of the block, in order to show the passages for the oil from either end of the axle into the respective

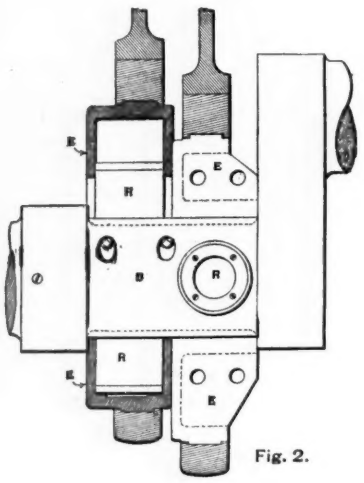


Fig. 2.

clyinders for moving the eccentric into forward or backward gear. A photograph was shown of the "Sussex" locomotive, a passenger engine on the London, Brighton & South Coast Railway, which has been fitted with this reversing gear.

Construction of Gear.—The square block B, Figs. 1 and 2, mounted on the crank axle, is parted diagonally and bolted together at the corners, its four faces being planed to the square. On two opposite faces are cast the rams R working in the small cylinders cast in the two halves of the eccentric E, which are bolted together on the center line as usual. The internal faces of the slot in the eccentric are planed to slide upon the parallel faces of the blocks. The lot is long enough to allow the eccentric to slide across the center line of the axle into the extreme positions of forward and backward gear; and the block is so set on the axle as to give this motion at right angles across the line of the crank when the piston is at either extremity of its stroke, and outside the center line of the axle,

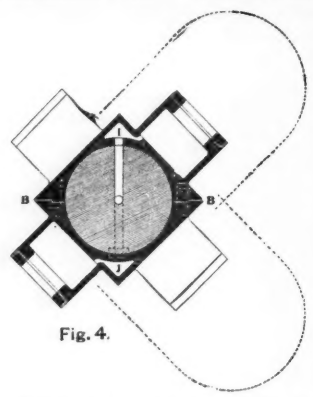


Fig. 4.

If, however, the centre line of the valve spindle is not parallel with the center line of the piston rod when both are projected upon the same vertical plane, then the block must be slightly turned round upon the axle, until at

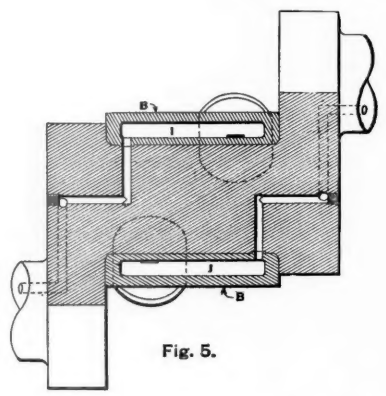


Fig. 5.

either extremity of the piston stroke the slot is at right angles to the center line of the valve spindle, instead of to that of the crank.

Oil.—The oil enters at each end of the axle, Figs. 3 to 5, and passes along the central hole to nearly the middle of

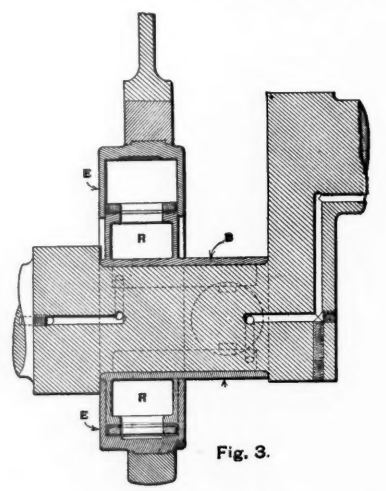


Fig. 3.

the length, whence it is led radially into the two longitudinal channels I and J formed in the corners of the block B. From one of these channels I it passes to the two rams for giving forward gear and from the other channel J to the other two opposite rams for giving backward gear. The oil forced from the reversing cylinder C through one of the pipes P to either pair of rams displaces that from the opposite pair, and drives it back through the other pipe P into the opposite end of the reversing cylinder C. It thus acts as a continuous non-elastic medium, transmitting exactly the motion of the piston in the stationary reversing cylinder C on the footplate, through the pipes P, P, to the rams actuating the eccentrics; and the eccentrics are thereby shifted and held in any position, without being affected in the slightest by the revolution of the axle, and quite independently thereof. The fluid-pressure reversing gear thus serves all the purposes of the levers, clips, etc., which have hitherto been used in other reversing gears, but is devoid of parts subject to wear and tear and requiring repair.

As an additional security for the stability of the eccentrics in any position, and in order to keep them both relatively in the same grade of gear, they are locked together in the manner shown in Fig. 9, by means of a pin and block K, fixed in the inner face of one eccentric, and sliding diagonally in a slot S formed at an angle of 45° in the inner face of the other eccentric. Thus when one eccentric is falling vertically from full forward to full backward gear, the other is simultaneously sliding horizontally through precisely the same extent of shifting; and for all intermediate positions the two eccentrics are maintained, both of them, in the same grade. As each is in its best position to sustain the strain of driving its own valve at the time when the other is in its worst position, they mutually assist in keeping each other in place, and so to a considerable extent relieve the pressure upon the oil.

The oil pipes PP enter the ends of the axle through stuffing-boxes, as shown in Fig. 10; the gland is screwed into the axle, and is prevented from unscrewing itself during the revolution of the axle by a squared head and bridle. A collar screwed and pinned on the inner extremity of the pipe prevents it from being forced out of the gland by the pressure of the oil, which has varied from 60 to 100 lbs. per square inch.

Reversing Cylinder.—The reversing cylinder, filled with oil, is shown in Fig. 11. It is placed at C, Figs. 6 to 8, on the engine footplate; and from its opposite ends the pipes PP convey the oil to the opposite ends of the crank axle. The piston in the cylinder is moved in either direction by a screw on the piston rod, which works in a nut forming the boss of the handwheel H. Any movement of the handwheel thus produces a corresponding movement of the eccentrics. The movement of the handwheel is assisted by a small air cylinder A added behind the oil cylinder; by admitting compressed air from the Westinghouse brake reservoir into either end of the air cylinder through the four-way cock F, the reversing is rendered so easy that it can be done with only a couple of fingers on the handwheel, even when the engine is running.

Principles.—From the foregoing description of the arrangement it will be seen that the two leading ideas in this plan of reversing are: firstly, that the same mechanism is employed for forward and backward running, reversal and expansion being effected simply by the change of position of the mechanism; and secondly, that this change of position is effected, not by any mechanical combination, which would necessarily be complicated, because the adjusting power must be stationary while the adjusted mechanism is in rapid motion, but by liquid pressure, of which the efficiency is independent of and unaffected by variety of movement between the adjusting and the adjusted mechanism.

Advantages.—The advantages attending this plan may be enumerated in the following order:

First, simplicity and largely reduced number of parts. Hence follows reduced liability to failure, because with fewer parts there are fewer to break down, and the parts retained may be made stronger; the fewer joints to be looked after and lubricated may also be better attended to. If any part of the fluid-pressure gear should fail, the only result is that the eccentrics gradually slip into full gear for whichever direction the engine may be running in at the time. Thus the engine is still perfectly competent to bring the train home, with the only disadvantage of not being able to use expansion for th time.

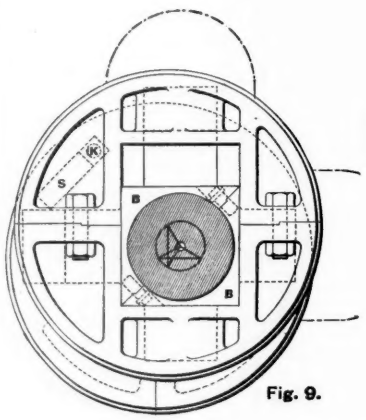


Fig. 9.

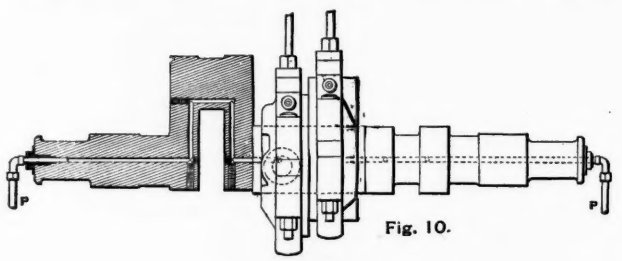


Fig. 10.

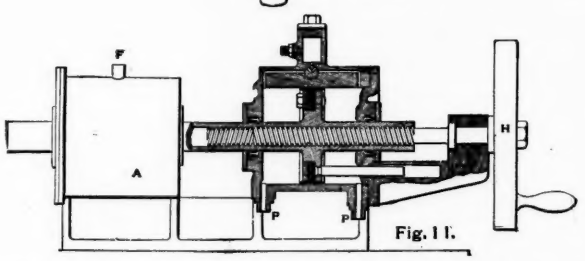


Fig. 11.

Second, truer distribution of steam. The distribution is indeed almost mathematically correct, both for the front and back ends of the cylinder, and also for forward

and backward gear alike. This is prominently shown by the exactly equal beat of the engine at all grades of expansion and when running in either direction.

Third, reduced cost of repairs. This reduction is a consequence not merely of the reduced number of parts, but also of the fact that the parts retained have so much larger wearing surfaces and so much smaller an amount of motion.

Fourth, considerably reduced first cost. In the construction of the gear there are no costly forgings, involving also expensive tooling. Nearly all the parts are castings, like cylinder castings, calling chiefly for boring and turning, which are not only the least costly of the operations in the tool shop, but also the least dependent on the workman for accuracy and finish. For every mechanical detail in the construction of the gear there are numerous and satisfactory precedents.

Furthermore, this gear can be adapted to every position where link gear is used, without any alteration of the engine; and for compounds it can be arranged to give varied cut-off for the high and low-pressure cylinders, in which case the two eccentrics are of course not connected with each other in any way. It is so simple in its construction that it is within the comprehension of any workman; and after it has originally been set in the workshop there is nothing left for the driver to adjust.

It is therefore not liable to the objection sometimes raised against the radial gear, that the drivers know the old link gear but cannot be got to understand the radial; an imputation, however, which, from his own experience, the writer thinks not fair upon their intelligence.

A Locomotive Load.

A certain Eastern road has a large number of ten-wheeled locomotives, which at this season of the year have been rated both east and west bound at 40 loaded cars. When this rating was made the maximum car capacity was 40,000 lbs., and the average car load in both directions was supposed to be about 10 to 12 tons. The yardmasters, train dispatchers and division superintendents have never had any means of knowing what tonnage cars contained, and have followed the rule to give the engines' loads equal to 40 loaded cars. The advent of the 50,000 and 60,000 lbs. capacity cars resulted in a slight reduction in the rating when the train was composed of a large number of large capacity cars. Recently the road in question has been making some interesting investigations to ascertain what tonnage was being hauled by locomotives. The following table, which we are permitted to print, shows the tonnage and characteristics of the freight on certain east bound trains for one day:

Number of Loads.	Freight.	Total Pounds.	Average lbs. per Loaded Car.
36	Flour, Beef and Mdse.....	876,278	24,341
23	Cattle.....	510,920	22,214
38	Cattle and Beef.....	806,800	21,232
34	Sheep, Horses and Provisions.	751,200	22,094
31	Grain and Mixed Freight.....	1,025,136	33,069
34	Beef and Provisions.....	742,908	21,850
36	Cotton, Malt and Provisions..	992,343	27,565
37	Flour, Provisions and Mdse...	867,038	23,433
38	Flour, Provisions and Grain..	986,889	25,971
34	Cotton, Flour and Provisions..	910,105	26,768
29	Lumber and Mixed Freight...	654,450	22,567
33	Sheep, Cattle and Beef.....	733,510	22,228
403	.....	9,857,577	24,460

It will be seen that the average car load varies from about 10½ tons to 16½ tons according to the characteristics of the freight. Engines drawing 37 and 38 loaded cars, and erroneosuly supposed to have been loaded nearly up to their economical capacity, had in reality much lighter trains than another engine of the same class with only 31 loaded cars. An official of the transportation department of the road in question advises us that these engines will make fair time with trains of 40 cars of coal or grain averaging 50,000 lbs. a car. This would appear to establish the maximum capacity of these engines at about 2,000,000 lbs. or 1,000 tons of paying freight on a road whose maximum grades do not exceed 35 ft. per mile. His investigation has developed the astonishing fact that, as now rated, his engines in many cases are not hauling half that amount of tonnage. The demand for quick time with high class freight unquestionably has much to do with the light loading of locomotives, but the principal factor is the erroneous idea of rating locomotives upon the basis of the number of cars per train.

Another fact worthy of note is that the above tabulated statement only shows east bound trains, upon which the average car load is about 12 tons. Our informant states that his investigation proved that the tonnage west bound was found to average only a little over 6 tons per car. West bound freight consisted mostly of light and bulky merchandise and not much of it in a car, but no difference was made in the rating of the locomotives. In one instance he found 15 loaded cars in one west bound train which did not average more than 3,500 pounds per car, making the aggregate equal to only one good big car load.

This road is now considering a plan to increase the average tonnage of freight per car, and to change the basis of rating locomotives from the car basis to the tonnage basis.—*Equipment Guide.*

Cleaning Locomotive Flues.

At the August meeting of the Southern and Southwestern Railway Club a report was read from Mr. C. T. Thomas, Master Mechanic Richmond & Danville, on cleaning flues in the round-house. The report follows and we reproduce also the engravings which accompanied it.

I find being used throughout the country the old auger, and in some cases, after flue augur has been run through, an air jet is blown through the tubes to clean out the loose stuff left by the augur. The enclosed print shows the attachment as gotten up by one of your committee, which is a cleaner and conveyor of sparks, utilizing the tubes of the boiler to carry off the dust and dirt to the opposite end from which the machine is operated. Its simplicity of manipulation, together with its small bulk, allows it to be operated in front of brick arches where they are used in locomotive boilers, and thus avoid knocking out arches to clean flues, which otherwise could not be done, its work being done with more rapidity than the flue augur, and leaving the flue entirely clean; at the same time the double wedges of the holder clamping the holder fast in the flue, and allowing cam motion to throw the double cylinders against the flue head, and making an air tight joint at fig. 8. The rubber diaphragm 22 preventing any air or dirt to escape around the flexible tubing and forcing it through the adjacent flue at the other end of the boiler. The stop cock 27 being placed at convenient position by the plug holder 29 being pressed in another tube. The arrangement also

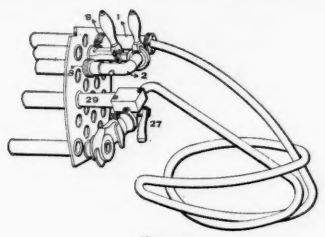


Fig. 1.

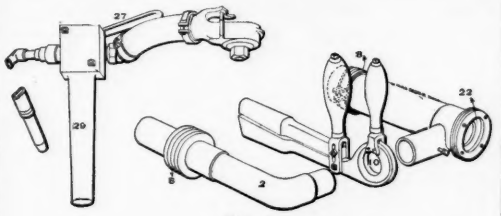


Fig. 2.

Boiler Flue Cleaner.

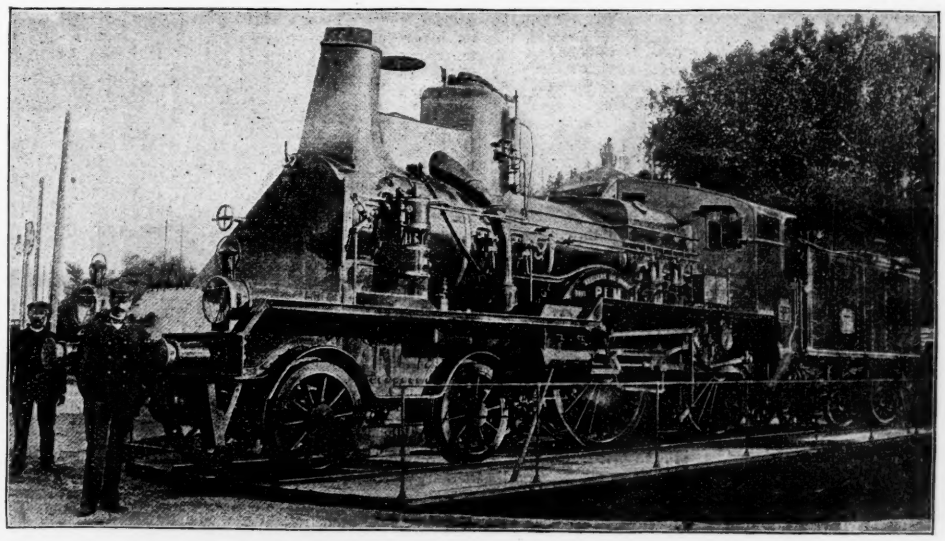
has the properties of extending the cylinders 1 and 2, so that they will reach to the deck plate in cleaning about No. 2, and take in the flues. It also has the advantage of allowing flues to be cleaned at any point on line of road where two engines stop at one time, so that the air of one engine can be used to clean the flues of the other without disturbing the arches, and it being also the only device removing the disadvantages, dust, dirt, and laborious manipulation, that has heretofore accompanied the old manner.

The Air Plow on French Locomotives.

We recently mentioned the rumor that the Paris-Lyons & Mediterranean Railroad has ordered 40 locomotives to be built, provided with beaks or prows, to cut the wind, and with various external parts housed in to diminsh air resistance. We are now able to show an illustration of one of these engines taken from the *Génie Civil*; and we show it simply as a matter of curiosity and as illustrating the vagaries into which intelligent mechanical engineers are sometimes led.

We are told that a trial trip was made with the first one of these engines with a view to ascertaining the comparative resistance, and that "it seems to have fulfilled the expectations and to have shown an improvement over earlier compound engines of the same company." We are not told, however, what the improvement was, or how much of it could possibly be attributed to the wind cutter; and the housing is so built into the casing of the engine that it would be impracticable to take it off and make comparative experiments with the same engine.

It will be seen from the engraving that the front of the engine, the smoke box, the dome and the cab are provided with conical or inclined shields. The buffer beam and the steps of the running board are also provided with planes standing at an inclination of something under 45 degrees with the horizon. It will be observed, however, that many of the external parts are not housed in. The Frenchmen call these "locomotives á bec"—prow locomotives.



The New "Locomotive à Bec" of the P. L. & M.—France.

The Street Railway Association of New York.

The 12th annual meeting of the Street Railway Association of the State of New York, was held at Syracuse on the 18th, Mr. D. B. Hasbrouck, the President, being in the chair. The report of the Executive Committee showed that the present membership consists of 30 companies. The first report presented was that of Mr. J. D. Craven on "Economy in Electric Power Stations." He spoke of the importance of rational firing and of good boilers, and mentioned his own experience with coal oil as a boiler cleaner. He uses about a pint a day in each boiler, putting it in with the feed water by means of a sight feed lubricator. He spoke also of the importance of good insulation of boilers and pipes and of the economy of feed water heaters.

He has no doubt of the efficiency of direct connected engines over belted ones. They take up less room and there is a saving of from ½ per cent. to 3 per cent. in the slipping of belts. There is also a saving in labor and in the expense of wear and tear. He advises large units also and keeping the load as near the normal capacity of the engines as possible. He calls especial attention to the necessity of having ample copper in the outside lines, having the rails well bonded and putting in return wires where the system is large enough. He asks "What is the use of expensive and economical machinery in the power-house if you allow 20 per cent. of the power to be expended heating up poor connections in the return circuit?"

In the discussion Mr. Craven was asked if he would advise direct connected engines for roads say from 15 to 25 cars. He thought that he should. With regard to the use of a return wire, that he said would depend more on the number of cars than on the length of the road, but a road 6 miles long with 10 cars would require a return wire as well as bonded rails. In the discussion of this subject a good deal was said about the capacity of the return, but singularly enough not a word was said about the necessity for preventing corrosion of pipes and other underground material.

The next paper presented was that of Mr. George W. McNulty on "Recent Improvements in Cable Traction." We published part of this last week and conclude it this week.

Another paper presented was by Mr. Allan R. Foot on "Taxation."

The following officers were elected for next year: President, G. Tracy Rogers, Binghamton; First Vice-President, John H. Moffitt, Syracuse; Second Vice-President, William W. Cole, Elmira; Secretary and Treasurer, William J. Richardson, Brooklyn. Executive Committee—D. B. Hasbrouck, New York City; John N. Beckley, Rochester; Daniel F. Lewis, Brooklyn. The next convention will be held at Albany, N. Y. In the afternoon the visitors took a drive around the city and in the evening attended a banquet made in their honor.

Models were exhibited by the following firms: H. W. Johns Co.; Consolidated Car Heating Co.; Taylor Electric Truck Co.; Cutter Electrical Mfg. Co.; Davis Automatic Car Shade Co.; Peckham Motor Truck and Wheel Co.

Track Elevation in Chicago.

A citizens' committee was recently formed in Chicago for the purpose of assisting in the matter of track elevation and a sub-committee appointed to report on the present status of the question. The report of this committee, which was recently made public, expresses considerable satisfaction with the progress already made on the elevation of the tracks of the Lake Shore & Michigan Southern and the Chicago, Rock Island & Pacific, and-

with the prospect that the Pittsburg, Fort Wayne & Chicago will soon follow. We make the following extracts from the report which will show the progress already made on the two roads above mentioned:

Retaining walls of solid rubble masonry are now nearly completed on the east side of the right-of-way from Seventeenth to Twenty-second street, these walls being required owing to the close proximity of individual ownership to the tracks. The rise from the present track surface is: At Sixteenth street, 1 ft., Seventeeth street, 2 ft., Eighteenth street, 4 ft., Nineteenth street 6½ ft., Twentieth street, 8½ ft., Archer avenue, 9 ½ ft., Twenty-first street, 8½ ft., Twenty-second street, 11 ft., thence to Twenty-fourth, 10 ft.

There are 37 iron bridges spanning the various streets and alleys included in the distance from Sixteenth to Sixty-first street, that at Archer avenue being the most important, as the crossing is diagonal and involves a longer structure than any of the others.

The abutments at the various crossings are to be of first-class Cleveland stone masonry. Those at Archer avenue have the foundations already completed. It is the intention to push the work until finally completed unless interrupted by severely cold weather. If all abutting and adjoining railroads in and near to the territory now under improvement were to raise their tracks it would be a great mutual advantage in the matter of construction. Your committee are also of the opinion that great advantages in the operation of the roads now being elevated would ensue both to themselves and abutting lines were the work general as to all roads, notably in this locality. The Pennsylvania Railroad would be greatly benefited were it to adopt the highly commendable plan of the Lake Shore & Michigan Southern and Rock Island roads.

Your committee has learned incidentally, though not definitely enough to go into particulars, that the Fort Wayne road is likely, upon proper solicitation, and if it receives as satisfactory treatment as has been accorded to the Lake Shore & Michigan Southern and the Rock Island roads by the Council and executive officers of the city, to in the near future enter upon a plan of elevation of their tracks which will be equally desirable and advantageous to the city of Chicago and be a credit to the humanity and public spirit of all the roads. If they adopt such a course it will deserve as much commendation as your committee is glad to testify is due to the Lake Shore & Michigan Southern and Rock Island roads for their splendid, timely, and energetic action in driving the entering wedge that must in the near future bring about a complete system of track elevation when and where such is possible and desirable.

It is reported that an ordinance is now being prepared providing for the elevation of the tracks of the St. Charles Air Line, to be introduced at the meeting of the City Council, Sept. 24. This is a hard job, though if successfully done it will greatly aid in the elevation of the tracks of other roads.

Artillery in the Locomotive Repair Shops.

We recently had an opportunity to see a new and ingenious tool, which is considerably used in the repair shops of the Erie Railroad, and which we saw in the Jersey City shops, Mr. H. A. Childs, Master Mechanic. When we saw it, the tool was used to remove a rusty bolt from the upper bar of a locomotive frame. The bolt had been broken or cut off close to the surrounding metal and was removed by the gun shown in the engravings. The gun stood on the lower bar of the frame, being blocked up to bring it near enough to the bolt which was to be fired out. A piece of board 1½ in. thick was secured about 10 in. above the bolt to protect parts of the locomotive. When the gun was fired the bolt was

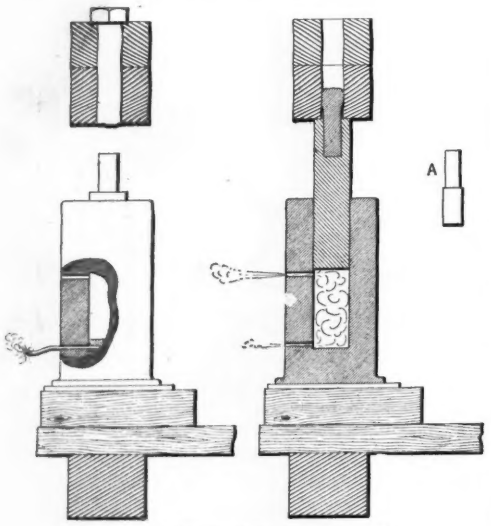


Fig. 1. A Gunpowder Punch. *Fig. 2.*

promptly shot out of place, splitting the board as it went. This gun was made from an old crank pin 10 in. long and 5 in. diameter. The head of the pin was not cut off. A 2-in. hole was bored axially about 8 in. deep in this pin, and a touch-hole was drilled through its side into the bore at about ½ in. from its end. The touch-hole should be but little larger than the fuse to be used —the latter of a good quality and not too fast burning. About 4 in. from the muzzle a ¼-in. vent hole was bored through one side of this gun, and this hole might be larger with advantage. A ram 8 in. long was turned to an easy working fit for the 2-in bore. In the outer end of this ram a socket, 1 in. in diameter was bored, axially about 2 in. deep, with a flat end. A tool-steel punch, 4 in. long, was turned to an easy fit for the socket, and both of its ends were finished flat.

Taking slightly less than half an ounce of powder, a little was put into the 2-in. bore of the gun, one end of a fuse 6-in. long put through the touch-hole, and the remainder of the powder put into the bore, covering the end of the fuse, which was thus surrounded with powder. The ram was lowered into place and by its weight did all necessary tamping of the powder. After setting the punch in the ram it was ready to drive a 1¼-in. bolt. Being set in line, blocking was placed under the breach to raise the gun so high that, on discharge the ram would go into the position shown in figure 2, but little more than uncovering the vent through which the superfluous pressure escapes.

Heretofore, the tool steel punch, which should be in diameter about ⅘ that of the refractory bolt, was not tempered and its end frequently became upset, as shown in figure 2, indicating that a harder temper would be economical. To make smaller punches for smaller bolts it might answer to turn down one end as shown at A, but the small shoulder might damage the locomotive frame, and, therefore, a ram with a smaller socket is best for the smaller punch, which may then be shot right through after the bolt, if it is tempered so as to prevent much upsetting. This tool is now in use at the Susquehanna, the Jersey City, the Hornellsville and other shops of the Erie Railroad, and Mr. Mitchell speaks well of it.

Cast Steel Draft Sills and Body Bolster.

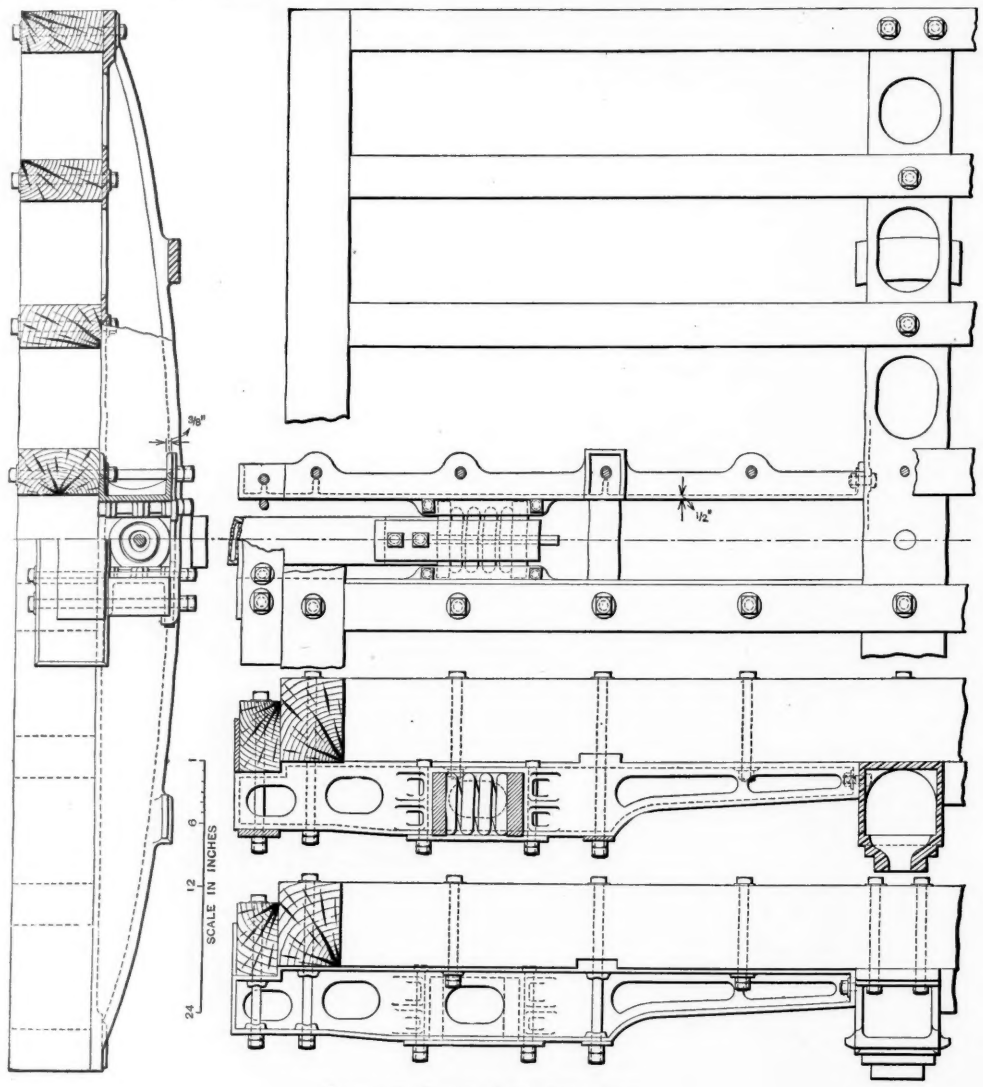
With growing confidence in cast steel and the reduction of its cost, there has appeared plenty of evidence that its merits are appreciated by railroad men, and especially by those interested in the manufacture of cars either as designers or builders. We illustrate a form of body bolster designed by Mr. T. C. Salveter, St. Charles, Mo., and intended to be made of cast steel, either basic or open hearth. Also shown in combination with it, is a design for draft sills to be made of the same material.

The body bolster is rectangular in section, hollow, and tapers from the middle to each end, as will be seen in the side elevation. The body center plate and the top side bearing are cast with and from a part of the body bolster or transom. Openings in the top and bottom serve to reduce the weight and facilitate their manufacture, the location and extent of the openings being dependent upon the design of the car, the strength required and the location of the center sills. The transom is fastened to the sills in the usual manner with bolts.

The draft sills are of light and simple construction, and are easily adaptable to any design of car. They are bolted to the under side of the center sills and to the end sill and buffer block. The rear end is shown bolted to the body bolster. The draft sills shown are adapted for use with the common form of draft spring and yoke, though the design can easily be changed to permit the use of any other device if required.

A number of these sills have been in use for some time on the Kansas City, Fort Scott & Memphis, with the American continuous drawbars. They are used on its road in connection with wrought iron body bolsters of the ordinary type, the end of the draft sills passing between the upper and lower members of the bolster.

It is claimed that the combination shown greatly simplifies the construction of the car and reduces the cost of repairs, as the parts are practically indestructible. A patent has recently been granted to Mr. Salveter on this design of body bolster.



Salveter's Central Steel Draft Gear.

The Blackwall Tunnel.

At the recent meeting of the British Association, Mr. Fitzmaurice read a paper on the Blackwall Tunnel under the Thames, being built for the London County Council, Mr. A. R. Binnie, Chief Engineer. This work has been under construction for more than two years, the contractors being Messrs. Pearson & Sons, and contract price £871,000. Mr. D. Hay and Mr. Fitzmaurice are resident engineers, and Mr. E. W. Moir, who will be remembered as having had charge of the Hudson River tunnel, is engineer in charge of the work for the contractors.

The tunnel is 27 ft. in external diameter; that is, 6 ft. more than the St. Clair tunnel. The total length is 6,400 ft. and the portion lined with cast iron is 3,083. It carries a roadway 16 ft. wide and two foot paths each 3 ft. 1½ in. There are four vertical shafts, two on each side of the river, varying from 75 to 100 ft. in depth, each being a wrought iron caisson 58 ft. in diameter at the bottom and 48 ft. internal diameter, lined throughout with brick Each caisson is made of two wrought iron skins, 5 ft. apart, braced together, with a cutting edge. Circular holes temporarily plugged while sinking are left along the tunnel through the shaft. The space between the skins is filled with concrete. Two of these caissons are in place and two others are being sunk.

The lining rings of the tunnel are 2 ft. 6 in. long, measured on the tunnel axis, and each consists of 14 segments and a key piece. They are 2 in. thick, with flanges 12 in. deep, and all joints are planed.

The shield is 19 ft. 6 in. long, 27 ft. 8 in. in external diameter, the outer shell being made of ⅝-in. steel plates. There are two vertical diaphragms, permitting a higher air pressure in the working face than in the completed tunnel. The space between the diaphragms is an air-lock. The shield back of the air-lock consists of but one shell, which takes in at least one completed ring of the tunnel and inside this the rings are built. Grout is forced in to the spaces left around the rings, holes being left in each segment for this purpose. The working face is divided into four horizontal floors and 12 vertical

chambers by vertical and horizontal diaphragms. There is a hanging iron screen in each compartment, about 6 ft. back from the cutting edge, designed as a safety chamber to prevent the men being drowned in case of a rush of water. The shell weighs about 250 tons and is pushed ahead by 28 hydraulic jacks which can exert a total pressure of over 3,000 tons.

Heavy Engines or Light Grades.

Last February Mr. Henry C. Thompson, member of the Civil Engineers' Club of Cleveland, O., read at a meeting of that club a paper on the Improvement of Grades and aligments as compared with increase in weight of locomotives. The paper was published in the May issue of the *Journal of the Association of Engineering Societies.* We give it below nearly in full, together with the discussion had at that meeting.

Railroads constructed for light traffic, and operated with light power, must be strengthened in order to carry a heavier traffic, and, at the same time, it would be necessary either to reduce the grade or to increase the weight of the locomotives. If the latter course is pursued a non-productive weight of locomotives must be carried over the levels and low grades, or else relays of power would have to be used at the grades. An increase in the weight of locomotives involves a corresponding increase in the weights of the rails and joint fastenings, in the number of cross-ties and in the strength of the ballast, although the construction of the subgrade might not be affected. Expenses for repairs would, of course, also be increased. An increase in the weight of locomotives also necessarily involves a strengthening, or a renewal of the bridges on the line.

Let us compare two single-track railroads, each 100 miles long, with 1,600 feet of bridging in spans varying from 70 to 145 feet (shorter spans not considered)and each having a capacity of 60 trains per 24 hours. One of these railroads has a maximum grade of 35 feet per mile and is laid with steel rails weighing 70 pounds per yard. The other has maximum grades of 50 feet to the mile, and is laid with 90-pound steel rails.

In comparing these two roads we shall neglect the extra cost of the maintenance of the subway in the second case and the extra cost of running the locomotives, and shall assume that the cost of repairs to the locomotives will be the same in both cases. We shall also confine our attention to the operations of freight trains, and these, strictly speaking, govern the business of a railroad. We will assume that in each case a train consists of 35 cars, each weighing 12 tons and loaded with 20 tons of freight, making in all 32 tons per car, or considerably more than the average load in a mixed traffic. The total weight of our train is thus 1,120 tons.

To haul such trains properly we shall require in the first case, a locomotive and tender weighing together 86 tons, the engine alone weighing 108,000 pounds, with 96,000 pounds on the drivers; in the second case a locomotive and tender of 101 tons, engine alone 134,000 pounds, with 120,000 pounds on the drivers, both engines being of the consolidation type. Assuming the cost of the locomotive, without the tender, at 7 cents per pound, the light locomotive would cost $7,560, and the heavy one $9,380. The cost of keeping in good repair a locomotive in active service averages $5.00 per day, or $1,825 per year. In five years this amounts to $9,125, or more than the average cost of the two locomotives in question. We may say, therefore, that a locomotive is renewed every five years.

Neglecting the cost of repairs of the engines, but considering only the difference of $1,820 in their first cost, we have an excess of $5,460 per engine as representing fifteen years' work, and this, on sixty locomotives, would amount to $327,600.

Experience has pretty well established that the practical life of a steel rail in main track is about 7.5 years. This being the case the rails would require renewal once in fifteen years, assuming that they are new when laid. A 90-pound rail will weigh 141⅓ tons per mile of track, and a 70-pound rail 110 tons, and this will make a difference in favor of the lighter grades of 3,143 tons on a road 100 miles long. This, at $24 per ton, amounts to $75,432, which may properly be considered as additional capital invested.

At the end of 7½ years we should have, allowing for loss in weight, 3,000 tons of scrap, worth about $27,000, as an offset in favor of the road with the heavier grades.

At the end of fifteen years we should then have

Excess of first cost of 100 miles 90-pound rail over 70-pound rail	$75,432 00	
Fifteen years' interest on same	56,574 00	
Excess of cost of renewal of 100 miles 90-pound rail over the 70-pound rail at the end of 7½ years	75,432 00	
7½ years' interest on same	28,287 00	
		$235,725 00
Deducting the proceeds from two sales of scrap		54,000 00
We have left		$181,725 00

as the net excess of expenditure for the heavy rail in fifteen years.

The required increase in the weight of bridges, for the 1,600 feet assumed, would amount to about 80,000 pounds, which at 4 cents per pound would cost $3,200, the interest upon which, at 5 per cent., would be $160 per annum, or $2,400 in fifteen years.

Summing up, then, we find that in fifteen years the net excess of cost of the line with heavy grades over that with lighter grades will be:

For rail	$181,725 00
For locomotives	327,600 00
For bridges	2,400 00
Total	$511,725 00

or an average of $34,115 per annum, which would represent a capital of $682,300.

Assuming average conditions as to location, we may suppose that not more than one-half of the assumed length of 100 miles would require any material reduction of grades, so that the $682,300 would be applied over a length of not more than fifty miles. Again, we may reasonably assume that the material taken out in the excavations would suffice for the embankments and this would further reduce the distance to twenty-five mile, so that $27,292 per mile would be available for the improvement of grades.

The foregoing figures indicate that it is true economy, in providing for increase of traffic, to improve the grades of a road rather than to increase the weight of its locomotives; for, although the cost of the improvement is the same in either case, we see that, at the end of the fifteen years assumed, the improvements in the grades remain as a permanent betterment for all time, while the expenditure on increasing the weights of the locomotives must be repeated every fifteen years.

If, now, we compare a road with a maximum grade of 35 feet per mile with one having the not uncommon maximum of 65 feet per mile, we find that in the latter case we should require a locomotive and tender weighing 123 tons, or 166,000 pounds for the engine alone, with 150,000 pounds on the drivers, to haul the given train; and this, of course, would largely increase the excess above that found by the foregoing estimate.

In any given case the engineer should first determine, from a correct profile of the line, the weight of the locomotive required to haul the given load with such ease that it can be reasonably depended upon to make the schedule time. He should then so design the revision of the grades that the cost of such revision shall equal that which, if the grades were left unchanged, would be required by the necessary increase in the weight of the locomotives.

Cases frequently occur where it is impossible to effect a satisfactory revision of the grades at a reasonable cost or where commercial considerations and the business advantages of an existing location render such revision inadvisable. In such cases it is better to use helpers, of about the same capacity as that of the road engines, rather than to employ excessively heavy engines on the steep grades; for the light helpers are available upon any part of the system,, whereas the heavy engines cannot be advantageously employed except upon the limited stretches for which they are designed. The use of helpers, however, obviously necessitates the construction of a second track on the territory where the helpers are used.

If a heavy grade occurs at a terminal, as is usually the case on north and south roads terminating on the lake shore, it may be found desirable to construct at the top of the grade a yard in which road trains may fill out their complement of cars.

In discussing this subject we have barely considered the question of speed, assuming that the locomotives have sufficient power to start their trains on the maximum grade without assistance and without the necessity of running at the grade. That the engine should always be sufficiently powerful for this is obvious when we consider that a train is at any time liable to be stopped, as by a danger signal, in the midst of a grade.

The stalling of a freight train on a grade is an expensive luxury in the matter of time, to say nothing of other considerations. Such a stalling, on a busy line, means an interruption to the traffic of the entire line during its continuance, so that on a line moving 30 trains each way daily, or 2½ trains (both ways) per hour, if we assume, as before, that each train has 35 cars with 20 tons each, or 700 tons of freight per train, we have, for one hour's detention, a loss of 2½×700, or 1,750 tons, in the handling capacity of the line.

In addition to the foregoing considerations we must bear in mind also the danger to which the operation of heavy grades is necessarily exposed. This, although not reducible to dollars and cents for the purpose of a comparison like the present one, is alone an important argument in favor of the improvement of grades and alignments.

DISCUSSION.

Mr. C. P. Leland.—Do I understand Mr. Thompson to say that the life of a locomotive is 15 years? We figure the life of a locomotive on the Lake Shore road at about 25 years.

Mr. Thompson.—I do not mean to say that your engine is thrown away; but merely that the cost of repairs in five years at $5 per day per engine would buy a new engine. Five dollars per day may be considered a minimum for repairs; some roads show as high as $7.

Mr. Leland.—On a road with 500 locomotives, 25 locomotives or 5 per cent. would pass out of existence, and would require to be replaced by 25 new ones every year.

Mr. Hosea Paul.—I think that many civil engineers are needlessly afraid of heavy locomotives and rolling stock. A mistake of this kind was made some twenty years ago on the Fort Wayne Road. The veteran civil engineer who directed its fortunes in those days was so anxious to save his track and bridges that competing roads were soon found to be hauling much greater loads than his road could haul. The early railroads of England at enormous expense, secured lines nearly level and almost straight, and this practice was to a certain extent repeated in the railroads of Ohio. Many of these were built for double track. The Cleveland & Pittsburg, for instance, had its bridge abutments prepared for a second track, but for the most part this second track has not been laid. Before incurring considerable expense for reducing grades and changing line, we must look up the improvements that are going on in the mechanic arts, and we may thereby very possibly avoid much of these outlays for construction.

The Lake Shore Company has spent many millions of dollars to reduce very moderate grades. It was done as a measure of economy, and this has no doubt fully justified itself; but even here it might be of interest to institute a comparison between this policy and that of introducing heavier rails, heavier locomotives, more complete signal and block systems, etc.

Many railroads having but a very moderate traffic have attempted to hew down the face of nature and smooth out its rough spots, but the undertaking has not usually been profitable.

Mr. Thompson.—I think Mr. Paul has misunderstood me. In the early part of the paper I made the remark that some of our earlier roads, for economy in first cost, were constructed with sharp curves and heavy grades, as the traffic was light. I advocated this, and I believe that it was right for those conditions, because those early roads acted as pioneers in opening up the country. Those who built the roads cared little whether they earned anything or not, for the profits were expected to follow the increase in the value of the country developed. As the demand for transportation increases, you must increase your facilities for doing it, either by reducing grades and curvature or by increasing the weight of engines; and I believe that greater attention than is usual should be given to the former method. In ordinary country you will not find more than three or four ruling grades in 100 miles. Suppose you have a 65-feet grade, one of 50 feet, one of 45 feet and one of 35 feet. You must provide your motive power for the heaviest grade, and this gives a great and wasteful excess of power on the levels and lighter grades. A rail lasts somewhat longer on a level than on a grade; but the level requires the same amount of ties and the same ballast. The idea I wish to convey is that while an increase of the power over the practice of 20 or 30 years ago is proper, the excessive increase, bringing in use great engines weighing 112 tons and over, is not economy.

Mr. Paul.—I understand the propriety of disposing of engines so as to bunch them on the heavy grades. That idea came to us from the West, as did also that (which Mr. Thompson condemns) of using short grades of exceptional steepness and overcoming them by a run.

Mr. E. A. Handy.—It is very difficult, perhaps impossible, to lay down rules that shall apply to all roads. Each road must take into account its own physical and financial conditions before it can determine whether it is advisable to reduce its grades. On the Lake Shore Road the engine that formerly hauled 35 cars to-day hauls 50.

Mr. William C. Jewett.—Many roads are built with as much as 60 per cent. of their line on the maximum grade adopted for the road. In such cases, when the grades are long, the only remedy is either to rebuild the road on a new location or to increase the motive power. There is a tendency among engineers to adopt long, straight lines at the expense of low grades; curvature in connection with low grades is not objectionable. In determining the maximum grade for a new line recently, one location gave a 0.35 per cent. maximum grade and another a 0.45 per cent. grade, the latter being the shortest and cheapest route. Investigation showed that with the motive power that was to be used the difference in the capacity of the two grades was about four cars per train, or, for the traffic in sight, a difference of one train per day. The lowest grade was consequently adopted as the most economical.

Mr. W. H. Searles.—Many quantities enter into this equation of economy, and we cannot arrive at a final conclusion until we carefully consider them all. It is difficult, therefore, to discuss the question in an open meeting. It must be pored over at the engineer's desk, and after a consideration of various statistics. Still there are a few main points that are pretty well established. One of these is that, other things being equal, a larger locomotive is more economical to the railroad company than a small one. For instance, for a given amount of power distributed among three locomotives, the expense is less than if it were distributed among four. The reason lies not only in the capacity of the machine itself, but also in the number of locomotive and train hands required. But with increase in the power of the locomotive comes the rapid wear of tracks and the necessity of enlarging and strengthening bridges. Other things being equal, economy is always favored by light grades. If the grades were established at the best rate for the located line, it becomes a serious matter to change that grade on the same line. But in general we must admit that the tendency is toward larger capacity of cars and locomotives, heavier bridges and heavier rails, and it seems that the end is not yet.

Undoubtedly there is a limit to the economical increase in weight of locomotives, as there was found to be a limit in steamship practice. Our modern engineers across the water, when they designed the Great Eastern, undertook to jump at a conclusion, to reach at one bound an unprecedented point of economy. Instead of climbing by degrees from one size to another, they built that enormous vessel, and it was a loss to its successive owners until it was broken up for scrap. So there must be a limit to the size of a locomotive on a given width of track. We are now probably getting somewhere near that limit. It has been well said that the problem is one which must be separately solved in each separate case according to the circumstances of that case. I do not see that we can decide, off-hand, a question so intricate as this. The discussion, nevertheless, is pleasant, and very likely profitable, and the figures of the paper, I think, will be valuable as a contribution when we have the opportunity of reading them in print.

The increase in weight and cost of track is not solely due to the use of heavier locomotives. Both freight and passenger cars are built heavier, and of greater capacity, than formerly; and a track sufficient to carry these will, in general, be heavy enough for the locomotive which hauls them. The weight per lineal foot of the heaviest loaded cars is now not much less than that of locomotives, so that in this view the weight of rail required is independent of the maximum grade. The grade limits the length of the train but does not effect its weight per lineal foot.

Mr. Leland.—On the freight service of the L. S. & M. S. Railway. there are used: Mogul engines—maximum weight, 59 tons; minimum weight, 40 tons; 10 wheel engines (6 drivers), weighing 49 tons; 8-wheel engines—maximum weight, 54 tons; minimum weight, 30 tons. There are ordinarily 230 engines in freight service. These averaged last year 36,006 miles each.

Notes on Instruments for Testing Bridges.

At a meeting of the Verein für Eisenbahnkunde Mr. Leschinsky read a paper on the present status of instruments for testing iron bridges, of which we give a short abstract. The life of iron bridges is considered by some as unlimited, provided they are well cared for, while other engineers believe it to be from 50 to 100 years. The great cost of the renewal of iron bridges renders it important to determine as exactly as possible when a structure ought to be rebuilt. A mere ocular inspection is not sufficient to do this, and periodically repeated measurements, with the help of instruments, become indispensable.

The deflection is frequently measured in the following manner. A piece of paper on a board is fastened to the truss in the center. Against it is placed the point of a pencil, which is stuck through a vertical plank placed alongside, and the point describes a vertical line on the paper when the bridge deflects under a load. But the results are inaccurate, as the length of the line cannot be measured exactly, and expensive, as temporary staging is necessary. This method has been improved in various respects.

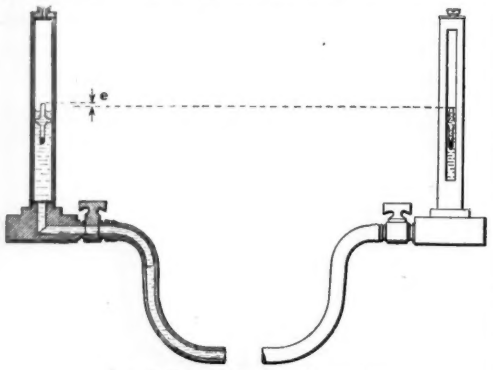
A narrow plank and pencil have been suspended from the truss, turning on a hinge. Before and after the loading the pencil is made to describe an arc on a fixed piece of paper. The distance between the axis, which can be measured more accurately than a line, gives the deflection. A steel point and a zinc plate are proposed instead of the pencil and paper. Certain engineers record the deflection on a revolving paper-covered cylinder, and others run a wire, which is fastened to a weight of about 65 pounds, over a sheave turning a hand, which records on a graduated sector.

To all of these instruments objections have been raised, as they are said to be unfavorably influenced by the current of the water if the staging is built in it, by air current on high viaducts, and by internal friction. Their

installation and use is mostly tedious and difficult, and while the elastic deflection may be found, these instruments are unfitted to measure a permanent deformation.

The value of determining the elastic deflection was widely discussed a few years ago, and the following is a short resumé of the discussion. A small elastic deflection does not prove anything for the safety of a bridge. An elastic deflection larger than the calculated one may point to causes dangerous to the bridge, or may be irrelevant to its security, especially as the co-efficients of the theoretical formula for deflection are arbitrary. On the other hand, an exact measuring of the permanent deflection is considered valuable and even indispensable, because an increase would indicate progressing deterioration of the structure, often not perceptible to the eye, which would lead to its collapse. This could be caused, for instance, by a gradual shearing off of connection rivets.

The permanent deflection may be measured with the Wienhold apparatus. This consists of a communicating gas pipe attached to the chords of the bridge and provided at some panel points with tees, into which graduated vertical glass tubes are secured. Water poured into the main pipe will stand equally high in all stand pipes, and its levels are marked at the first loading of the bridge. A lowering of the panel points will be indicated by the change of the water levels. This apparatus is expensive, and has sometimes not proved itself as reliable, probably due to leakage of the pipe joints. Further are used the leveling instrument and the Fuchs apparatus, which are sufficiently accurate for spans between 13 and 250 feet. The sunlight, though, often hinders an exact reading. It is further frequently not possible to set up the leveling instrument on a bridge suitably and safely. The Fuchs apparatus requires iron brackets, over which sights are taken, the fastening of which is often inconvenient. It has recently been employed on the Vistula bridge at Dirschau, but neither it nor the leveling instruments have so far found any wide use, principally on account of the tediousness of placing and adjusting them. A thoroughly suitable instrument would have to fulfill about the following requirements: It must be simple and, if possible, without adjusting screws. It must be applicable without difficulty on all large and small, old and new bridges. It must be for the determination of the deformation of a chord, and also the changes of levels of all panel points with and without loading the bridge. The measurements must be possible without a staging, and must allow checking of results.



Seibt's Bridge Testing Apparatus.

Determination of the deflection under a moving load need not be required. Concerning the latter, it may be mentioned that it has been measured either larger or smaller than with an equal dead load. As an explanation of the smaller deflection it has been said that the moving load does not act vertically but diagonally in the direction of the motion, and it must therefore be decomposed into a vertical component smaller than the load, and into a horizontal one which equals the position. As cause of the increased deflection is given the dynamic effect of the moving load. The most probable cause of the variations, however, might be that the locomotive in running oscillates on its springs, and that the deflection becomes greater or smaller according to whether the downward oscillation occurs about in the centre of the span or not. For that reason it may be preferable to omit measuring the deflection under a moving load, and perhaps to specify for a calculation of the deflection to increase the load in a certain proportion to the span.

An apparatus by Dr. Seibt, which fills the above conditions, is illustrated herewith. It consists of two vertical glass tubes, connected by a thick rubber hose of ½ inch diameter and 52 feet length, the tubes partly filled with distilled water. In each tube is a float of black glass weighted with quick silver. The elevation of the floats is read by means of a slotted and graduated tube slipped over the water tubes, on which slides a sleeve with vernier. The top of the slot in the sleeve and the top of the float are adjusted to the same elevation which is then read. The two floats do not sink equally deep into the water. To ascertain the error it serves that the shoulder of the base of the glass tube on which rests the measuring tube has exactly the same elevation over the foot plate of each instrument. The difference of reading will give the constant error when both instruments rest on a level, horizontal surface. The instrument is used as follows: To the main trusses are fastened shallow cylinders, Fig. 2, about 40 ft. between centers. The cylinders have two studs which fit into recesses in the base plates of the tubes, thus preventing them from sliding off. Leveling from cylinder to cylinder along one truss and back by the other to the starting point, that is, from a to b, c, d, e, f, fig. 3, letting always the same glass precede, the test of correctness can be made by subtracting the sum of readings of one glass from that of the other glass. The difference must be zero, considering the index error e, which has to be multiplied by the number of readings. The accurateness of this instrument is $\frac{1}{250}$ of an inch.

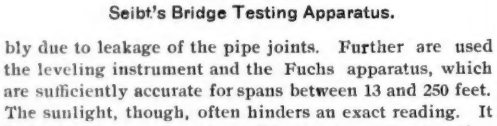


Fig. 2.

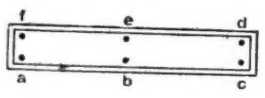
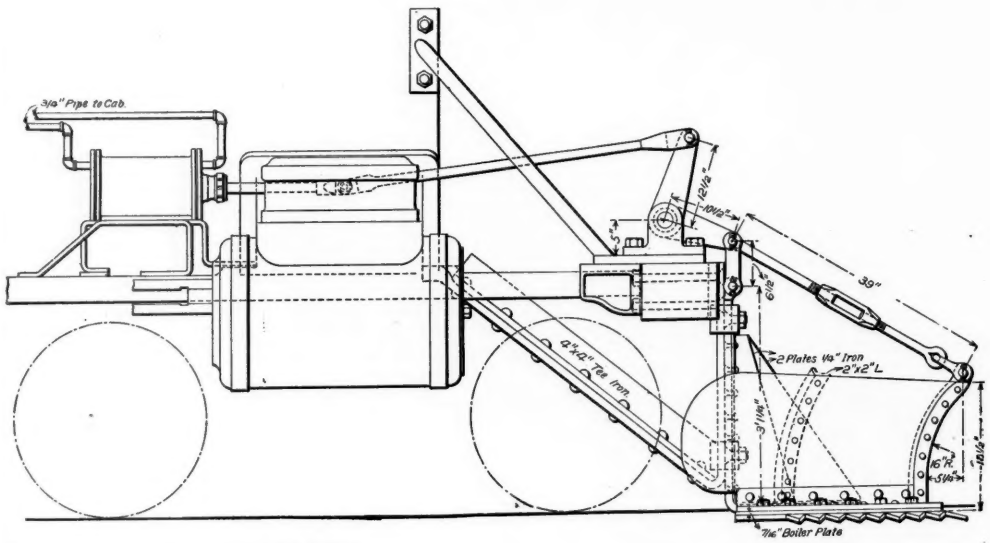
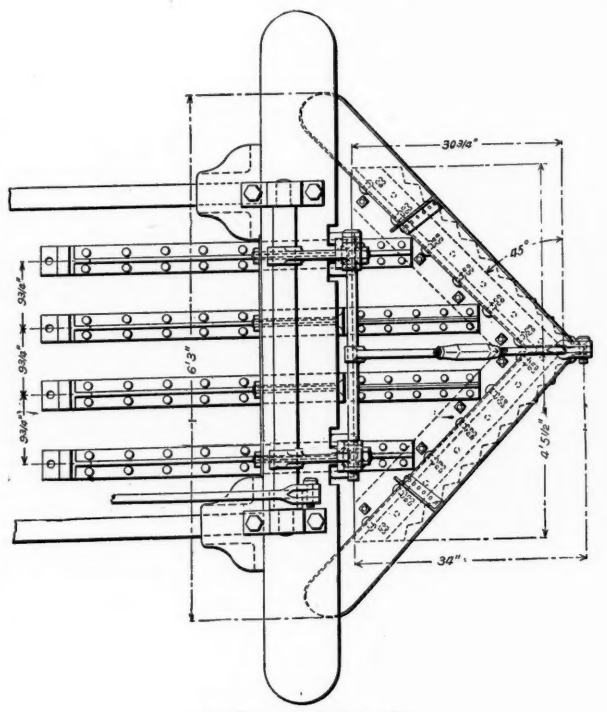


Fig. 3.

A Compressed Air Ice Plow.

The idea of replacing the pilot of a locomotive by an ice plow or flanger and operating the same by means of air pressure is, we believe, somewhat novel. That the idea has been ingeniously worked out is shown by the accompanying illustration and that the arrangement is a practical success was proved by the good work done by it last winter. The plow and it methods of operation were devised by Mr. J. E. Keegan, Master Mechanic of the Grand Rapids & Indiana, and on that road the plow was used last winter. It gave entire satisfaction both in removing the ice from near the rail, on the inside and in removing the comb that forms midway between the rails. Four 1 in. x4 in. bars are secured by long bolts to the bumper timber as shown in the drawing. The bars extend down to within about 3 in. of the top of the rail, and then are turned back diagonally to the lower front edge of the cylinder casting. They are secured to this casting and are stiffened by 4 in. x 4 in. tees. This furnishes a stiff backing for the plow. The plow slides up and down on the vertical bars. The construction of the plow will be readily understood from the drawings. Two rocker boxes are bolted to the front ends of the engine frames, and the shaft which turns in these boxes has two horizontal arms, which are connected, by means of links, to the top edge of the plow, and a vertical arm which is connected by means of a reach rod with the piston rod of the air cylinder. The air cylinder is secured to the frame, just back of the engine cylinder. A three-way cock in the cab controls the passage of air to and from the operating cylinder. The plow is shown in its lowest position with its cutting edge below the top of the rail as it is when in use.





Ice Plow worked by Air.

The Critical Side of Mechanical Training.

What follows are a few extracts from the very attractive address of Professor A. B. W. Kennedy, at the recent Oxford meeting of the British Association. The address was delivered before the Mechanical Science Section of which Professor Kennedy is the President:

I know well—too well—that in the present congested state of the engineering profession there are many of us who do not like to hear the word "training" mentioned at all. It seems to mean merely the preparation of more lads to struggle for a share of work that is even now insufficient to go round. There is no doubt much to be said for this point of view. But against it one must remember that all other professions are equally full, and that, after all, lads must do something. The fault is surely that there are too many lads. And even the most conservative of us are compelled to recognize that the standard required in engineers' offices now is enormously higher than it was thirty years ago.

The particular aspect of mechanical training of which I wish to speak is its critical side. I do not know how a man should be trained to be an inventor. To be a creator in mechanical matters, is a faculty given only to a very few, and with them it is "born, not made." Many of us, however, without being either inventors or creators, have sufficient natural aptitude or inclination towards things mechanical to form a basis for the trainer or educator to work on, with some hope that he may be of service. An engineer is a man who is continually being called upon to make up his mind. It may be only as to the size of a bolt; it may be as to the type of a Forth Bridge. But whatever it is, once it is settled it is decidedly irrevocably—it is translated into steel and iron and copper, and cannot be revoked by an Act passed in another session. The time given him in which to decide may be a day, or a month, or a year, but in any and every case it is about one-tenth part of the time which he would like to have. It is only in rare cases that the decision is obvious—most often there are more courses open than even the most facile politician ever dreamt of. The matters are too complex to be dealt with mathematically or even physically; even if they were not, there are few engineers who would have the special capacity to handle them. Moreover, their solutions are seldom "unique." From this point of view, the whole use of college training, of workshop practice, of practical experience, is to provide the engineer later on with the means of critically examining each question as it comes up, of coming finally, rapidly and positively to some defensible decision, which may then be irrevocaby carried out. The development of the necessary critical faculty should be one of the chief aims of every teacher and every student. A scientific training cannot make a man an engineer. Perhaps it is impossible for anything to make a man an engineer unless he has grown that way from the beginning. But a scientific training may make him, or at least, give him the possibility of making himself a critic. It is not easy to overrate the importance to the engineer, as to other folk, of the power of saying clearly what he means, and of saying just what he means. I do not mean only of doing this for its own sake, but because if a man cannot say or write clearly what he means it is improbable that he can think clearly. It is difficult to know how this matter can be taught, but at least it can be insisted upon probably to a much greater extent than is commonly the case. A man requires to see clearly not only the exact things which he wants to say but the whole environment of that thing as it appears to him. Not only this, but he must see the whole environment of the same thing as it appears to the persons for whom he is writing, or to whom he is speaking. Moreover, it is a great help to clearness of thought and expression to keep before one always an ideal audience of people who will certainly misunderstand every single sentence about which any misunderstanding is in any way possible, and some others as well. In attempting to think out or to discuss any question, whether it be technical or non-technical, in fact as long only as it is non-political, the first necessity

is probably a knowledge of the question itself, and not only this, but also a proper understanding of its whole environment. This knowledge must be of such a kind as to distinguish what parts of it are important, what parts of it are unimportant, what parts can be described in two sentences, and what others may require as many paragraphs; what parts affect the result but little, however large they seem; and which ones must be considered vital, although their very existence is difficult to discover. The faculty which enables a man to handle his knowledge in this fashion may be summed up in the single expression "sense of proportion." Moreover, the knowledge, to be of real value, must be as totally free from prejudices and prepossessions as the most rigorous branch of pure science, and as thoroughly imbued with a healthy spirit of scepticism. The very first necessity to the critic is that he should have what I have called the sense of proportion, a sense which will enable him to distinguish mere academical objections from serious practical difficulties, which shall enable him to balance twenty advantages which can be enumerated on paper by one serious drawback which will exist in fact, which will enable him in fact to place molehills of experience against mountains of talk. It is perhaps a doubtful point how far this sense of proportion can be taught at all. No doubt it can only be built up upon some natural basis. Probably the best special education in proportion which a man can have is a course of quantitative experimental work. I say "quantitative" with emphasis, as meaning something much more than mere qualitative work. Here, I think, comes in the usefulness of the engineering laboratory. Our first duty is generally to find out the conditions; if they are disadvantageous (in fact, I mean, and not merely in the problem) to alter them if they can be altered, but not to ignore them because they are inconvenient. We have then to find out the extent to which the known conditions permit any exactness of solution at all, and, finally, we have to keep this in view as a measurement of the highest accuracy which is attainable. To work out certain branches of the problem with such minuteness as to give us apparently very much greater accuracy than this is not only useless but is apt to be positively misleading, as giving an impression of an accuracy which has no real existence. The relative value of accuracy in different sets of observations is in itself a matter in which a sense of proportion is wanted, and often very badly wanted. I believe that experimental work in an engineering laboratory can educate this critical sense of proportion very admirably in a number of ways. In the first place, it directs quantitative work into very varied channels, and not along one particular line. Secondly, it compels the observer to combine a number of measurement in such a way that the relative importance of accuracy in each can be seen. Once it is found that a final result is exceedingly little affected by a particular set of changes, it ceases to be of importance to measure or observe those changes in any extremely minute way, and of course the reverse holds equally good. Finally, and this perhaps is the most important matter of all, measurements in such a laboratory are made to a great extent under the complicated conditions under which the actual final result has to be obtained in practical work. They are not made under the conditions which insure the greatest individual accuracy of each result.

It will be seen that throughout, but particularly in the two last points which I have mentioned, the work of an engineering laboratory is in intention and in essence different from that of a physical laboratory. The aim of the latter is to make its problems as simple as possible, to eliminate all disturbing elements or influences, and o obtain finally a result which possesses the highest degree of absolute accuracy. In most physical investigations the result aimed at is one in which practically absolute accuracy is attainable, although attainable only if infinite pains be taken to get it. It is the business of the physicist to control and modify his conditions, and to use only those which permit of the desired degree of accuracy being reached. In such investigations it sometimes becomes almost immoral to think of one condition as less important than another. Every disturbing condition must be either eliminated or completely allowed for. That method of making the experiment is the best which ensures the greatest possible accuracy in every part of the result. The business of the engineer, on the other hand, is to deal with physical problems under conditions which he can only very partially control, and the conditions are a part of his problem.

A critical training in matters mechanical is, however, only too similar to the celebrated training of the Mississippi pilot which so nearly broke the heart of Mr. Mark Twain. Whenever the whole matter seems to be completely mastered from one point of view, it is only to find, with a little more experience, that from another point of view everything looks different, and the whole critique has to be started afresh. Machines cannot be finally criticised—that is to say, they cannot be pronounced good or bad simply from results measurable in a laboratory. One wishes to use steam plant, for instance, by which as little coal shall be burnt as possible. But clearly it would be worth while to waste a certain amount of coal if a less economical machine would allow a larger saving in the cost of repairs. Or it might be worth while to use a machine in which a certain amount of extra power was obviously employed, if only by means of such a machine the cost of attendance could be measurably reduced. In fact, what may be summed up in the phrase the "worth-whileness" of economies, is in itself a matter on which a whole paper might be written. Unfortunately, the latter points which I have mentioned are just such as cannot easily be measured in laboratory work, or, indeed, in any other way whatever, except by actually using the apparatus in question. All that can be said is that a careful training in the critical measurement of comparatively simple points, fits a man more than anything else to gauge accurately the importance of such other matters as I have mentioned. No doubt there are many men in whom the critical faculty is insufficiently developed to allow them ever to be of use in these matters, but to those who are intellectually capable of the "higher criticism" must be, I think, of inestimable benefit to have had a systematic training in the lower.

Is there, then, any general standpoint from which mechanical criticism can be directed? Certain points are obvious, but probably the whole matter cannot be generalized. Perhaps in one sentence we may say that that scheme, or system, or machine, will be the absolutely best in any particular case which will the longest survive and maintain its place in its particular environment. I cannot doubt that this development of Darwinian ideas in the world of the inorganic is a legitimate one. Of course the problem would be comparatively easy in each particular case if only the environment would stand still. It would even be comparatively easy if we knew how the environment was going to alter, but this we are unable to do. We only know that it certainly *will* change and will go on changing, and that therefore the things which we make now have not got to survive in the conditions in which we make them, but have got to survive through some new sets of conditions of which we know nothing. I do not think the difficulty is in any way met by the popular method of guessing at what will be wanted fifty years hence, which generally means simply guessing at something very big. It is of no use making our ships or our engines of a type which we choose to imagine will be that of fifty years hence. If we do they will be of no use to-day, and for that very reason they will not even be in existence, useful or other, at the end of the fifty years. Sufficiently sad illustrations of this will occur to everyone in very different directions. I hope I shall not be considered churlish in saying that I do not think that the men who have worked on this principle have really been far-seeing, or have really brought us much forward. They have been men often of genius, often of great personal fascination, always of immense imagination. But they have proceeded by methods essentially opposed to anything like the gradual evolution which must occur in technical as it does in natural matters, and in too many cases the results of their labors have not even been giants, but only monsters.

It is sometimes, I am afraid, rather humiliating to have to remember that, to a very great extent, the question of the fittest, so far as it affects us, is a financial one. In manufacturing processes efficiency and economy tend to survival because they lead to decreased cost of production. In structures or other large permanent works those types tend to perpetuate themselves which require the least material—that is, in which the material used is disposed to the best advantage—and in which the outlay on labor is also smallest, assuming, of course, equal fitness in other respects. There is, no doubt, at present a tendence to dispute this altogether, and to treat all reductions in cost of labor as disadvantageous, unless, indeed, the labor be very highly skilled, in which case its remuneration must necessarily be brought down for the sake of equality. I imagine this tendency will last exactly as long as the faithful can get some other people to pay the increased cost, and will thereafter determine itself somewhat suddenly. It can no more stand in the way of natural progress in engineering matters than could the somewhat similar outcry against the introduction of machinery into manufactures two generations ago. It would be as wise to paint a generation of cats green, in the hope of compelling natural selection to work along new lines.

I think we may fairly assume, therefore, that efficiency and economy are both legitimate criteria as to ultimate fitness, and will remain so. Moreover, they are both matters in which measurements can be made, and as to which judgment can be guided by such measurements. But there are other characteristics, not directly measurable, by which we can in some degree form an opinion as to the ultimate fitness of things or processes.

One set of considerations which has great critical importance is summed up in the word *simplicity*. This does not mean fewness of parts. Reuleaux showed long ago that with machines there was in every case a practical minimum number of parts, any reduction below which was accompanied by serious practical drawbacks. Nor is real simplicity incompatible with considerable apparent complexity. The purpose of machines is becoming continually more complex, and simplicity must not be looked at as absolute, but only in its relation to a particular purpose. There are many very complex-looking pieces of apparatus in existence which work actually so directly along each of their many branch lines as to be in reality simple. . . .

Very closely allied to simplicity is what I may call *directness*. In nearly all mechanical processes certain transformations are unavoidable. In many mechanical processes, as I have recently had occasion to mention, a very large number of transformations is at present practically unavoidable. I myself cannot help thinking that probably one of the most distinct signs of fitness is a reduced number of transformations, the bringing of the final and the initial stages as close together as possible, and cutting out altogether the apparently worthless middle processes. But any generalization of this kind must be very cautiously handled; these apparently useless processes are no doubt in certain cases as indispensable (as is the much abused middleman in matters economic.

In a critical view of any case where similar results are aimed at by hand work and by mechanical means, it is important to recognize that the similarity of result should very seldom become identity. In the first machine to do anything mechanically which has before been done by hand, the error is often made of trying to imitate the hand-work rigorously. The first sewing machines were, I believe, made to stitch in the same way as a seamstress. It was not until a form of stitch suitable for a machine, although unsuitable for hand, was devised, that the sewing machine proved successful as a practical matter. In another but analogous line too you may remember that the first railway carriages were practically stage coaches put upon trucks, from which the present carriages have only very slowly been evolved.

The critic has also to remember that very often the attainment of some very unimportant point, or point of which the importance has been greatly exaggerated, is made the reason mechanically for very great complication. The question of proportion comes in here again, and it has to be considered in any particular case whether the academically perfect machine, which is also extremely complicated, is not inferior to the *almost* equally good machine which has been constructed in a practicable shape—it almost always is so.

I have endeavored in my remarks to indicate what appears to me to be the attitude of the engineer towards a very large portion of the work which comes into his hands. In order to deal with the work it is necessary for him first of all to have a certain definite knowledge of "things," that is to say, both of the various subjects which form part of the curricula of all technical schools, and of the further matters which form as it were his professional alphabet These last he learns not from books or lectures as a student, but by example and attempt, as does an artist. Of this part of his training I have said nothing; it has been perhaps sufficiently talked about of late years, and there is little to say which I could have made interesting to a general gathering like this. I cannot leave it altogether, however, without dealing with one matter. Exceptional men are all-round mathematicians or physicists, still more exceptional men are both; but for ordinary folk the study of one side of mathematics or of a single branch of physics is the work of a lifetime. The engineer is bound to know his own profession by hypothesis, and it is in itself no small matter. Yet, in addition, he must know some mathematics, some physics, some chemistry, even also some geology, if he is to take any high rank in it. It is, therefore, surely in the very nature of things impossible that he should be a great mathematician or a great physicist, or should devote as much study to those most fascinating sciences as if they themselves were the work of his life.

Smoke Prevention in Chicago.

Since the fight against smoke first began in Chicago, there has been considerable reduction in the density of the cloud which usually overhangs the city, due partly to the fact that many of the factories have been compelled to close partially or completely on account of lack of business, and partly to the frequent introduction of appliances intended to insure a more complete combustion of fuel, or to a change in the fuel used. A number of devices were put on the market, which gave fairly good results when properly handled, but in order to avoid the necessity for the installation of costly plants and careful handling, many consumers began the use of crude oil, natural gas or hard coal. Natural gas, piped from northern Indiana, is used in a few steam plants, the gas company taking on a small number of plants at low rates, until the meter consumption shall equal the supply. Hard coal was used only in extreme cases on account of its high cost. The use of oil has shown a steady increase for several years past, though its use is limited by reason of the difficulty in handling and storing it in a manner satisfactory to the insurance companies.

The more recent efforts of the smoke inspection department have been directed against the railroad and towing companies. Experiments have been made on locomotives and tug boats with various fuels and appliances. With the tug boats the present situation is interesting. The use of hard coal has been objected to, not only on account of its expense, but because of the peculiar conditions met with in the Chicago River. Navigation is necessarily slow in busy seasons, because of the numerous bridges and the narrow channel with its many abrupt turns. In many places the channel is barely deep enough to float some of the larger vessels when heavily loaded. For these reasons boats are often held for as much as an hour at a time, and it is necessary that when it is called on a tug shall be able to respond immediately. This, it is claimed, it is difficult to do with hard coal, though the reasons for it are not apparent, as hard coal can be used in similar circumstances on locomotives. Smoke consumers of various types have been tried, but with poor success, not entirely due to a lack of merit in the devices, but partly to the difficulty in persuading the men to operate them properly.

For several months past, experiments have been made by the Vessel Owners' Towing Company, with oil on the tug Black Ball. The boat was fitted up according to the ideas of the City Smoke Inspector, and after long experiments it was announced that the problem had been solved, that oil was a satisfactory fuel, and that by its use a saving of from 25 to 35 per cent. could easily be effected. The boat was then laid up for repairs and minor changes in the apparatus. The following week complaints were lodged against all the other towing companies for from 5 to 10 violations of the Smoke Ordinances, the Vessel Owners' Company alone being exempted. The chief smoke inspector being out of town at the time representatives of the rest of the towing companies called on the Mayor, who agreed with them that no practical substitute for soft coal had been proposed, and ordered the suits dismissed. It is said, however, that the experiments with the Black Ball will be continued as soon as the boat is ready. Arrangements are said to have been perfected by which permits may be obtained from the War Department for fitting up boats with oil burners upon application. The insurance companies do not seem to favor the project, and will probably raise insurance rates on the boats, and on property near the river, if oil comes into general use. With the exception of the Vessel Owners' Towing Company, all other tug owners manifest a decided lack of faith in the use of oil, this company alone claiming to be greatly pleased with the results thus far obtained.

The railroad companies have spent considerable money in equipping their locomotives with smoke preventers of various types, some of which are very effectual if properly handled. As might be expected, the results are not always satisfactory even with careful firemen, and the roads are still annoyed with suits brought by the city authorities, usually resulting in fines of from $5 to $50. Experiments have been made by one or two of the roads with oil as a fuel. The locomotives of the Standard Oil Company at Whiting, Ind., which are fitted with the apparatus recently described in the *Railroad Gazette*, have also been the subject of investigations by several railroads, but so far as we have been able to learn the reports have not been in favor of a trial of the system.

There has recently been considerable talk of New River coal as a practically smokeless fuel. The claims made for this coal are doubtless somewhat extreme, though it is much cleaner than the soft coal generally used in Chicago, and though somewhat more expensive, it has high evaporation powers. It has been used in quite a number of stationary plants and has been tried on several railroads. It has been reported that it has been adopted by two prominent railroads for use in the city, though the rumor cannot yet be confirmed. As it appears to be acceptable to the city authorities, it will probably receive all the consideration that it merits.

The Canadian "Soo."

Water was let into the Canadian ship canal at the Sault Ste. Marie on the 24th inst. It is expected that the canal will be ready for navigation within a month. The amount appropriated for the work was $4,000,000, and work was commenced on May 1, 1889. The canal is 3,700 ft. long and 21 ft. deep. There is one lock.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

We are glad to see that the International Railway Congress idea is making some progress in the United States. The Denver & Rio Grande is the latest company to "adhere." Besides that, at a Congress executive meeting held in Brussels two or three weeks ago, it was decided to accept the American Railway Association as a member of Congress. This was on the suggestion of Colonel Haines, President of that Association. The action of the executive committee of the Congress is very generous in this matter, for it practically admits all of the American railroad companies now members of the Association to membership in the Congress without further trouble or fees. This, we take it, is a quite unprecedented concession, and it would be mortifying if our own people do not receive it in the same generous spirit and take particular pains to accept membership promptly and to send good delegates.

The Inter-State Commerce Commission desires to get a decision from a court of competent authority compelling the Louisville & Nashville to comply with the recent order of the Commission reducing freight rates from the Ohio River southward, but the Commission's appropriation for expenses of that kind has about run out, and now, according to the press dispatches, Commissioners Morrison and Veomans have been accepting money from Chicago shippers to aid in prosecuting the case. Commenting on this incident the *New York Journal of Commerce* says:

> It is not clear that the Inter-State Commerce Commission has a right to pass the hat around among the beneficiaries of its decisions in order to raise money for their enforcement. If Congress has made an insufficient appropriation for its support in a condition of activity, it may be taken as a decision by the law making branch of the Government that it is more useful when dormant. The reasons why Anglo-Saxons insist on annual appropriations for the army is that they desire the existence as well as the cost of an armed force to be always within the control of the representatives of the people. If Parliament or Congress refused to make an appropriation for the army the Government of England or the United States might raise by private contribution enough money to keep the military forces together, but it would be a violation of the Constitution in substance, and probably the courts would hold it to be a violation in form.

People could more readily decide whether or not to approve the action of the Commissioners if they knew whether the body for which they act was a court or an administrative body. The "average citizen" is tempted to believe that it is both. According to the custom set by Chairman Cooley and his colleagues in 1887, the doings of the Commission are carried on with a good deal of the ceremony of a court, and the tone of its "reports and opinions" is still more decisive in that direction; but when an opinion of this "court" has to be appealed, the scene changes, and observers begin to wonder if the traditions are to be set at naught by the spectacle of judges taking an active hand in arguing for their own decisions, and accepting cash aid from interested parties.

Quite a squabble is going on in India over the bridges of the Bombay, Baroda & Central India Railway. A government inspector said that a very large number of the girder bridges on the line were condemned some time ago as too weak and he considered the replacement of these bridges as being unduly delayed. Until the girders are strengthened, heavier engines, which are greatly needed, cannot be permitted to run. Concerning this General Trevor, R. E., the Chairman of the road, thinks that the officer is too apprehensive. He (the General) went through a similar scare about 25 years ago when the bridges on the Great Indian Peninsula Railway were condemned wholesale. Most of those condemned bridges are still standing and have been in constant use ever since and have never caused an accident. The Chief Engineer of the Bombay, Baroda & Central India does not admit that the bridges are unsafe. They have been run over for upwards of 30 years without a failure from want of strength. General Trevor says the girders are admittedly weak when tested by the new rules of the Public Works Department, and they were not first-class in workmanship or design when first put up, though the material was good. Cracks have lately been found in some tension bars, but the General believes that they are old and were probably made when the girders were being erected. He does not believe that the danger of collapse is any greater now than it has been any time the last 30 years. He does not think that the Government is really much alarmed about these bridges, for he has not received any final orders what to do about the girders! Concerning this, *Capital* says that this company has some 700 spans and iron bridges whose present safety is doubtful and its ultimate fall is only a question of time. This we should suppose is true of any structure erected by human hands, but surely the chairman's treatment of the subject is rather light and airy considering the seriousness of the charges. One would suppose that he would be the first man to want to know the facts and to make the bridges safe without waiting for "final orders from the Government."

This prediction of the *ultimate* fall of the bridges of the Bombay, Baroda & Central India reminds us of an incident in the life of a gentleman who is now a very successful and distinguished bridge engineer, in fact one of the soundest in the United States. When he was a student at the Rensselaer Polytechnic Institute he chose as the subject of a thesis a wooden truss bridge then standing in Troy. He analyzed it through and through, up hill and down, and proved that beyond a doubt it was a miracle that it stood at all and predicted its ultimate collapse. Sure enough 25 years later the bridge was burned, and now the great bridge engineer points to his thesis as evidence of the remarkable acuteness which he displayed so early in his career.

Fair Dealing with Employees.

As to the relations between corporations and their employees, I am prepared to say that there is little or no occasion for trouble to arise between them. Their interests are mutual. Upon the success of the company depends the sustenance of the men, and upon the conduct and temper of the men depends the working condition of the railroad. The whole efforts of both sides should be, first to convince one another of this, and then, each being absolutely frank and fair with each other, to entirely eliminate the element of mistrust. To effect that end the president of a company, who is really the tone and spirit of the whole organization, should see to it that his subordinates are always ready to deal honestly and openly with the men, so that their desires and necessities may always have just consideration. The difficulties are to get rid of demagogues among the employees, and untrustworthy and unsympathetic officers among the higher appointees.

The foregoing is from a newspaper clipping reporting some remarks of Mr. E. T. Jeffery, President of the Denver & Rio Grande. We have not seen any fuller report of the address (or interview), and do not know in what connection these words were spoken; possibly they are too old to be treated as fresh news; but they express much in little space and are worth repeating, for the doctrine thus laid down is sound. Nobody, we should suppose, would question it for a moment; in fact, it has been frequently enunciated at home and abroad. The late Sir George Findlay, one of the ablest railroad managers of England, made it the main point in an argument before a parliamentary committee inquiring about strikes, that men should be fairly treated and that a feeling of mutual confidence should be cultivated. Nevertheless, however well recognized the doctrine is, it is well to bring it forward from time to time because it is fundamental and should be constantly kept in mind.

Furthermore, we agree entirely with the proposition that the actual head of the railroad organization is the man who sets the pace, and that more or less of his spirit goes down through the various grades, affecting the way of looking at things and doing things, more, perhaps, than he often suspects. It is not quite accurate, however, to say that this man is necessarily the president. He may be a vice-president or he may be a general manager. He is the strong man in the operating department. We are quite ready to admit that it is his business to cultivate a sympathetic knowledge of his men, the highest as well as the lowest, and to impart that sympathy and knowledge to his subordinates. In fact this is a doctrine that we have often dwelt upon.

But is there not something else to be said? Is there not danger that by dwelling continually upon the importance of fairness and candor towards the men and of honest dealing with them, we should mislead ourselves and others into thinking that this fundamental principle is actually ignored in practice? We all know what creatures of phrases we are; how we go on saying the same thing over and over again until we get to think that it is gospel, without really criticising what is said to see if it is not essentially a lie. A good deal of the trouble of humanity has come from this habit of tagging along after a phrase. Is it not a little absurd to assume that the workmen are oppressed and deceived, and otherwise badly treated in this country? Let us reflect: They outnumber the class who may be vaguely summed up as bosses, or employers, say five hundred to one; they have precisely the same political and social rights and powers; they can outvote the smaller classes every time that they go to the polls; they are far more thoroughly organized; that is, they have put the conduct of their affairs into the hands of a few leaders to such an extent that their whole fighting force can be wielded promptly and handily, which was never true of the fighting force of the employing class, among the railroads at least, until the last great strike. So on the face of it, it is absurd to suppose that the workmen are oppressed in this last decade of the nineteenth century.

A short time ago we took occasion to give some extracts from a great number of the solemn agreements made between the employers and the employed; most of them signed, and all of them assented to, by the representatives of the employed. We found that these agreements provided for the protection of the rights of the men with extraordinary completeness; and we venture to say that there have been very few instances of violation of these agreements on the part of the railroad company, or of oppression of the men or imposition upon them by the officers of a railroad company within the last half dozen years, to go no further back. On the other hand, there have been repeated instances, half a dozen every year at least, of violation of agreements by the men employed; of want of candor and fairness in the conduct of the men towards their companies, of disregard by the men of common honesty in their dealing with the company; of outrageous oppression of the companies by the men. In fact the tyranny is all on the other side to-day and we may as well recognize this. We need not abandon our smooth phrases about being absolutely frank and fair and about eliminating the elements of mistrust and so on; but let us make them apply both ways.

Some Economic Features of Locomotive Evolution.

All who are familiar with locomotive construction now and as it was fifteen years ago know that something has been done beside increasing the power and weight. There has been selection, a survival of the fittest, a casting off of the unnecessary and useless. The locomotive has become known pretty thoroughly to a great many mechanics, with the result that hundreds of bright minds have left their marks on it. The intelligent labors of many have given a much improved engine. We do not mean in efficiency, for the reason that the conditions affecting the economy of operation have grown worse, not better. Locomotives are now worked harder, are run at higher speed and are made to haul heavier loads in proportion to their maximum steaming capacity than ever before, so that the improvement in efficiency is small, but the improvement in the design from a mechanical standpoint is important and marked by greater simplicity.

Take almost any detail of a locomotive at the present time and a similar one used fifteen years ago and there will be found a smaller number of parts and a simpler construction. The parallel rod is an excellent example. It is now a simple eye bar all in one piece, with a bushing for a bearing in each end. An oil cup spindle of some form holds the bushing in position, and the rod is made up of three parts, one body and two bushings. Formerly the parallel rods had straps and keys at both ends to make adjustment and there were some 27 parts—one body, two straps, two, and sometimes three, keys, two or three liners, four brasses, two or three set screws, four bolts, eight

nuts and sometimes two dogs. This reduction in number of parts has required no change in the operation or function of the locomotive. It has been the natural result of the better understanding of the functions of a parallel rod. It was formerly supposed that this rod must fit the crank pins perfectly and therefore a delicate adjustment was provided to take up the wear. Now it is known that to make a parallel rod work well and the engine run free the bearings need to be a little larger than the pins; and when the brasses are considerably worn the engine works freer and better than when they are a perfect fit. There used to be no end of trouble with locomotive runners, who were either superstitious about the action of their engines or had a quasi scientific turn, which led them to adjust the keys and brasses of the side rods whenever they felt a little nervous, with the result that the rods were not the same length between centers as the distance between driving wheels, and hot and bent crank pins were common. Of course the tighter the fit of the brasses on the crank pins the worse was the effect of a slight bending of the pins. It was a relief to master mechanics to learn that a solid end eye bar without adjustment made a good side rod, but it was a long time before many dared to use it. Even now the number of engines being built with keys in the side rods is surprising to those who have kept pace with the evolution of the locomotive.

The effect of the new simple side rod on the mind of that valuable but rare make up, the vigorous hustling practical mechanic with his strong natural sense of the "eternal fitness of things" and firm convictions about the limits of practical utility of machinery, has sometimes been very amusing. We remember a case where the management had given such a man a lot of new locomotives with keys in the side rods with the inevitable result of several hot boxes and bent crank pins within a month after the engines were started. Exasperated and full of righteous indignation he swore at the frills on the rods and ordered the blankety blank keys to be driven home solid and chipped off flush with the straps, and to-day all the old engines on that road built with keys are running in that way.

Following slowly after the removal of the keys from the side rods has come the taking out of the keys from the back end of the main rod, and not a few engines are running with no keys at the cross head end. Placing side by side on a machine a shop floor a set of rods with keys and another without them, one is struck with the comparative simplicity, strength and cheapnss of the newer type, and appreciates the tendency toward simplification in the evolution of details.

Formerly driving boxes were held in jaws in the frames, in which they were permitted to slide vertically as now, but there were adjusting wedges, front and back, so that the driving axles could be kept at the same distance apart on both sides of the engine, or kept "in tram." The temptation to continually adjust these wedges and the frequent "sticking" of the boxes and the breaking of the adjusting bolts led to the removal of the front wedge, and now the Pennsylvania, the C. B. & Q. and some other roads have removed the rear wedge, and no adjustment is provided except that obtained from sheet iron liners placed back of the shoes between which the boxes slide. The jaws are spaced accurately to start with, and no adjustment is needed except to provide for uneven wear, and the liners are sufficient for this. With this simple arrangement the engines pound less and are kept more nearly in tram than when the delicate adjustment was provided; and locomotive runners are no longer tempted to monkey with the adjustment. They are, in fact, ordered to let the boxes alone and do nothing but oil them, all adjustments being made by a man of judgment who is selected for the purpose. The frame jaws were formerly made taper but are now straight, the parts cost less to construct and the practical results are better.

No doubt some parts are made simpler because it is now possible to do more accurate work than formerly, but this is not true of most parts, as, for instance, the valve motion. Once the eccentrics were adjustable by means of set screws on the axles and the eccentric rods were adjustable as to length by clamp bolts in the eccentric strap, and the valve rods had a right and left adjustment where they are joined to the valve stems. These have all disappeared in the more modern designs and now the eccentrics are keyed to the axles, the rods are solidly bolted to the eccentrics and the valve rods and stems are rigidly held together. Formerly it was not uncommon to find the valve rods with keys and boxes of the type used on the old style of parallel rods, so as to provide a very delicate adjustment; now if any changes are required in the lead, or location of the valve on its seat, an offset key is put in the axle to change the lead and a liner or offset dowel is used to adjust the length of the eccentric rod. The practical result of this is that the historic "slipped eccentric" is seldom a cause of delay to trains, and the engineer needs to know little or nothing about the setting of valves in order to bring in his train in case of accident to the running gear. The parts have a fixed and definite length, and unless they break they cannot get materially out of adjustment except when badly worn at the joints.

Not alone in the running gear are recent changes tending toward simplicity and a less number of parts, but also in other details. The boiler is made of fewer sheets and the bracing is simpler, especially for the wagon top. The sides of the wagon top in the past were made flat and the gusset sheets were difficult, if not impossible, to brace, and heavy angle irons, placed vertically and connected by cross braces passing between the tubes, were always unsatisfactory. Now this part of the sheet is made circular and the taper of the gusset is so much less that bracing at that point practically unneccessary. The ponderous crown bars, with their great weight and vast number of parts, about 50 for each bar or 900 for each box, are gradually disappearing, and in the place are screw stays made of plain pieces of iron with threads, giving about 200 parts for the same size of fire-box. Domes in crown bar boilers were placed over the fire-box as a rule and were flanged to the top sheet of the wagon-top, and the wagon-top was flanged into the dome, making it difficult to get a tight fit and leaving a flange on the wagon-top sheet that was nearly impossibe to anneal after flanging. The latest designs have a dome seat of thick metal, pressed exactly to shape, which is seated on the boiler and so accurately formed that it can be made practicly tight for the whole life of the boiler without subsequent calking; and the dome itself is a plain cylindrical barrel without flanges.

There have also been improvements in method of construction, so that sheets are now laid out accurately and punched so truly that there is little if any of the cut and try work that used to be common. Boilers are not now partially erected for the purpose of marking holes in the proper position, but are set up only once, and that is for the final riveting together

The old pumps, tallow pots and steam chest oilers, feed cocks and clumsy checks have disappeared and the uniform working, and almost automatic, injector and the sight feed automatic lubricator are at hand to reduce the cost of construction, operation and maintenance and to give the engineer less to think about outside of his main duty, which is to keep to the schedule time and watch the road.

Then there are the automatic bell ringer, the pop safety valve, the almost perfect driver brake and the balanced valve easily handled by the reverse lever, and a number of other improvements, all of which give simplicity in construction or operation, especially the more convenient arrangement of the fittings in the cab, which make it less necessary for the engineer to be a practical mechanic conversant with machinery and engineering practice. The compound engine, it is true, has called for some additional thought on the part of the engineer and it has made the construction more expensive and complicated; but this is not true of all designs and, as if in keeping with the tendency toward simplicity in evolution, those designs of compounds that have been more complicated and required more attention have practically dropped out of existence, and all of the newer double-expansion locomotives are practically about as simple as the single expansion. Looking back, it seems as if the nick-names such as "soda fountains," "breweries" and "hay rakes" given in derision by locomotive runners to some types of compounds on their first appearance, were prophetic of their inevitable end, the scrap heap.

This tendency toward simplicity will not be decreased as the competition of the electric motor grows stronger, as it will from now on. The great difference in the number of parts that have to be cared for and watched by men on steam locomotives and motormen on electric motors will compel locomotive designers to strive harder than ever to make simple machines.

Ventilation of Passenger Cars.

So much of glittering generality has been written about car ventilation and so much psuedo science has gone into contrivancies designed by anybody but engineers and mechanics for the purpose of purifying the air in railroad cars, that it is gratifying to find that one committee of one of the great railroad societies has actually made a competent study and written an adequate report, which appears in the recently published proceedings of the Master Car Builders' Association. The committee has actually taken the pains to study the subject, and then to write down the result of its studies in clear and comprehensible English, and not without humor. Certain fundamental notions are laid down as ideal conditions. These are: (1) To supply 30 cubic ft. of fresh air per passenger per minute and to carry off an equal amount of foul air. (2) Admission of the fresh air at a speed of under four miles an hour in winter time. (3) Warming of the fresh air in winter time to about 70 deg. F. (4) Addition to the fresh air of enough moisture to give it the average humidity of the climate in which the cars are running, with a temperature of 70 deg. (5) The supply of fresh air in winter time to be independent of windows, doors and exhaust ventilators. (6) Distribution of the fresh warm air by many openings low down and exhausting of the foul air by many openings high up. (7) The action of the system to be independent of the speed of the train. (8) A plenum, or slight excess pressure, in the car. (9) The use of double windows, locked in winter time, readily opened in summer. (10) Inside swinging doors to form an air lock or inside vestibule.

The committee has not been content merely to lay down these fundamental requirements, but takes pains to show how they have been arrived at. Mr. William Forsyth, of the C. B. & Q., made careful tests to ascertain the degree of foulness of the air in sleeping cars, chair cars and day cars. Air which may be called pure contains from three to four parts of carbonic acid in 10,000. When it is in excess of ten or twelve parts the air is unhealthy. In his examination of sleeping cars he found the carbonic acid to vary from 11.3 to 22.0 parts and the average of eight observations was 18 parts. In chair cars the range for eight observations was from 6.7 to 15.5 and the average 10.7. In the suburban coaches the range for six observations was from 6.9 to 21.7 and the average 13.7

The temperature of the sleeping cars varied from 66° to 71°, which certainly was a very reasonable showing, and indicates unusual care on the part of the responsible officials to instruct the trainmen in their duties in this respect. These obsevations were made in February. The temperatures of the other cars are not given. The air in the sleeping cars it will be seen was very bad, in all cases much beyond the health limit. In the chair cars it was better, there being fewer occupants per cubic ft. of volume, the travel being mostly local, and "the passengers had done a good deal of kicking so that the porters were attentive to their duties."

This suggests what we have long thought and often said, that the want of proper ventilation of railroad cars is to a very great degree the fault of the traveling public. The mass of people seem to be singularly unintelligent in this respect; to have little conception of what is good air and what is bad, and still less of the dangers of breathing for any considerable time air contaminated by the presence of other people. Consequently, we find wherever we go that in the winter time cars are overheated, and, what is worse, even the arrangements for exhausting foul air closed; and if a trainman or porter tries to open them some one "kicks" We are not sure, but it would be a good plan for the officers of the railroads to have posted in all of their cars, and particularly in the sleeping cars, a few choice extracts from this report. We are told, for instance, that disease germs are given off in large numbers in the breath and spittle, and evaporation of the skin of unhealthy persons. This is especially true of people suffering from tuberculosis, whooping cough, fevers and so on, and the germs grow and multiply very rapidly in a foul, moist atmosphere. . . . Experiments made in Europe on animals inoculated with a preparation from the dust beaten out of the cushions of railroad cars in ordinary service, cars not known to have carried sick people, showed that most of these animals died of virulent diseases. Few of them lived long enough to die of tuberculosis; none of them survived. As these microorganisms are in the air and simply settle on the dust, all this goes to show how very necessary it is to carry off the foul air." Indeed, when one reads such accounts of the foes to life which constantly surround him he can only attribute the fact he lives to grow up to the activity of the benignant microbes, which devour and destroy the malignant ones.

The committee does not attempt to tell precisely how cars may be better ventilated. It is suggested that an entirely practicable method could be contrived where electric power is attainable, or by the use of compressed air, to drive the air into the coaches by small fans placed in the ends about half way between the roof and the floor, the air to be passed through heaters or heated in wind boxes or trunks and delivered in regular quantities at an even heat through convenient registers. Thus a constant plenum could be maintained; the speed of the train would have comparatively little effect on such a system.

The committee mentions the contrivance of Colonel Mann, which was applied to certain of the Mann boudoir cars, saying that it was entirely dependent for its action on the speed of the train, but in other respects it was an admirable plan: but it has been a general failure for the reason that the railroad companies and others operating the cars did not see that the men in charge were properly instructed, or that they carried out their instructions. The reader will probably remember that Colonel Mann's contrivance was to "put a nostril on the car." The air as forced in by the motion of the car or by the direction and force of the wind, was forced downward into a filter chamber where it passed through loose excelsior, the excelsior

being kept cool and moist by melted ice placed above it. In winter time the clean air then passed into a heating chamber and finally into a wind trunk running along the corridor, whence it could be distributed by reigsters at will. Our own observation of this apparatus leads us to think that there was a fundamental defect in it; that the route into the car, through the wind scoop, down the pipe, through the excelsior, then through the heating chamber and so through the wind trunk, was so torturous and obstructed that it needed more power than was furnished by the velocity of the train and the velocity of the wind to supply with certainty enough air. At any rate, we have been almost suffocated in a Mann car, fitted with this apparatus for experiment and demonstration, when the temperature of the external air was only about 80° or 85°, and the windows and doors were carefully closed. The amount of air brought in was inadequate as were the cooling arrangements. We had no opportunity, however, to observe it in winter time. Whatever may have been the merits of this device it failed entirely to answer one of the most important requirements of the committee, that its action should be independent of the speed of the train and of the direction and velocity of the wind.

The committee feels that with the information presented in the report and with the ten general conditions, which may serve as a test in measuring the efficiency of any system proposed, and with the information given as to the efficiency of various paterns of ventilators examined, it has done all that can be done in dealing with generalities; but it urges "that better rules and discipline be enforced to obtain the best results with the apparatus now in cars, and that the railroad companies and sleeping and chair car companies spend a little of the money now spent in flashy and extravagant interior decoration in providing better for the health and comfort of their patrons." This is thoroughly sound and sensible, and has the immense recommendation of being entirely practicable. We have never been able to discover any sufficient reason why trainmen and sleeping car porters should not be instructed in the use of thermometers and in the management of heaters and ventilators, and why they should not be held up to a strict observation of simple but adequate instructions. This, however, is one of our old and pet hobbies, and we should not venture to introduce it again now but for the very weighty endorsement of the committee; nor have we very much hope that much attention will be paid to what the committee says or to what we say until the public "kicks."

The Evolution of the Railroad Club.

While the term "Railroad Club" may have at first expressed the plan and to some extent the purpose of the local associations of railroad mechanical men, of which there are now six, it now gives a wrong impression of the real character of these associations. They are not clubs, as such are generally known, that is, where social intercourse and entertainment are the primary objects, but are mechanical societies, meeting generally nine times a year, with usually no entertainment except the annual banquet and an occasional excursion to see an engineering plant or structure.

The power of these societies is felt, not only in the Master Car Builders' and Master Mechanics' Associations, but by railroad companies and by the American Society of Mechanical Engineers and other engineering organizations. The technical character of the papers and discussions is in many cases of a high order and the demand has been so great for copies of the printed proceedings that some of the clubs can no longer supply them and many important papers are now out of print. When the "Rules of Interchange" come up for discussion and improvement each year, at the annual conventions, the opinions of the railroad clubs, brought out by the preliminary discussions, are always read before the conventions, and in most cases the recommendations of the clubs are adopted with comparatively small modifications. The higher officers of railroads take an active interest in the proper management and handling of the affairs of some of the clubs, and this has aided materially the executive committee of the clubs in keeping the work directly in the line of railroad mechanical engineering. The fundamental purpose of the railroad clubs is to collect facts from the experience of individuals, and put the information on record when elaborated by free discussion, so that it may become accessible for the use of others. This is done by selecting proper subjects to be investigated and written about by competent men and by having their writings pretty thoroughly discussed in the meetings; thereafter the whole is made a matter of record, and is distributed in printed form, not only among the members of the individual clubs, but also among the members of all the other clubs.

Perhaps the best example of the growth and development of these societies is found in the history of the Western Railway Club; and of that we speak particularly now because of some important steps that it is taking in the way of change of meeting place, likely to be beneficial. A few years ago a small band of railroad men, mechanical engineers and men interested in railroad mechanical devices and in technical journalism, formed a club at the Grand Pacific Hotel in Chicago. It is said that, owing to the long distances between the headquarters of railroad men in the West, there is a sort of mechanical lonesomeness that grows upon them, especially the younger ones, until they get so full of new ideas and facts that they have to "talk or bust," and this is given as the reason why, in a very short time, the Western Railway Club became too scientific and dignified to be satisfied with meetings held in the gloomy atmosphere of the club rooms of the hotel, which lie adjacent to the bar room and restaurant, and they graduated to the Traffic Association rooms in The Rookery, where they have remained until the present time. Now, having outgrown these rooms, they are seeking new quarters. An effort was made to take the society to another hotel, but, although inducements were offered in several ways, such as room rent free and cheap dinners, the society seems not to wish to get something for nothing, especially something that they might be better off without.

The club has so transacted its business in the past and has kept itself so free from question as to its fundamental purpose, and has so closely adhered to its specific object, that it has won the confidence of the higher officers of railroads, and at its banquet last week prominent officers of railroads were among the speakers, and letters of commendation and wishes for success were read from some of the best known general managers in the West. The *Proceedings* of the Western Railway Club for the past few years stand among the most useful publications sent out by scientific societies of this country. For practical value in every-day work they are excelled only by those of the large engineering societies. Step by step this club has freed itself from all burdens and conditions that might bias its actions or raise a question as to its adherence to the avowed policy of scientific advancement. The *Proceedings* are now given without favor to all technical journals alike and there is no temptation to delay the publications. The Secretary is paid a salary for his work and has no conflicting duties.

This society last year took an important step when it carried through a plan for the interchange of proceedings. This gives to each member of all the railroad clubs the complete proceedings of the five other clubs with little or no additional expense, and without increasing the dues. The club pays its own way with annual dues of $2 a member, and advertising in its publications, and stands squarely on its own feet. Owing to unusual expenditures last year and expenses incident to changing the beginning of the fiscal year, an assessment of $1 a member had to be made, but it is believed this year no assessment will be necessary. For the $2 each member gets five or six club proceedings for each of the nine meetings, or a total of about 50 pamphlets for $2, or an average of 4 cents each.

For the coming year further improvements are promised; perhaps the most important one is the introduction of topical discussions at each meeting as soon as the main question has been discussed and disposed of. The meetings will commence at 2 o'clock and continue until 5, the time being filled in, if necessary, with topical discussions.

Papers to be presented at the meetings are now printed, distributed and in the hands of the members one month before the discussion takes place. This year there are 106 new members. The St. Paul Road alone furnishes 53 members, and the Burlington and other roads a considerable number each. The subordinate mechanical men are encouraged by the superintendents of motive power to join, so that they may get the proceedings and attend the meetings when possible. This club has now among its members a considerable number of mechanical, civil and electrical engineers and patent lawyers, both in this country and in Europe, who have joined for the sole purpose of getting the *Proceedings*.

Taken altogether, the Western Railway Club has made substantial and rapid advancement, and while the plan it has followed may not be feasible in all respects for other railroad clubs, yet in the main it may serve as a guide to point out what can be done when members work together to make a dignified scientific society. We do not by any means ignore the growth and important work of the other clubs, but write particularly of the Western Club as being the most influential and typical.

Annual Reports.

Illinois Central Railroad.—The forty-fourth annual report of this company is for the year ending June 30, 1894. Naturally, it is a document of unusual interest, because this railroad was more affected than any of the other great companies by the World's Fair business. The principal results of operation are as below; the miles operated having been the same in both years, viz., 2,888.

	1894.	Increase.	Increase p. c.
Receipts from traffic	$20,657,464	$562,273	2.80
Operating expenses and taxes	14,369,416	85,482	0.60
Net from traffic	6,288,048	476,792	8.2
Net from sale of lands	26,841	.....	....
From investments and miscellaneous	1,865,325	605,739	48.09
From investment in surplus dividend fund	14,280	2,905	25.54
Total net	8,194,493	1,056,745	14.81
Surplus dividend fund brought forward	353,993	.....	....
Available for charges and dividends	8,548,487	1,185,405	16.1
Interest and rentals	5,231,218	722,129	16.0
Available for dividends	3,317,269	463,276	16.23
Dividends, 5 per cent	2,500,000	.....	....
Surplus dividend fund carried forward	817,269	463,276	130.87
Ratio operating expenses	69.36	Decrease	1.62

The increase in the gross receipts was from passenger traffic. The passengers carried for the six months from May 1 to October 31, at a uniform fare of 10 cents, for a journey of over 9 miles, aggregated 8,780,616, and in the regular suburban trains the passengers carried in the same period were 9,358,695. The travel in other passenger trains was unusually large, and as we have repeatedly said, there were no serious injuries to any of the World's Fair passengers. This record of a great and successful movement was one of the most remarkable facts connected with the whole World's Fair. A comparison of the principal sources of revenue is given in the table which follows:

	1894.	Inc. or Dec.		Per cent.
Freight	$12,253,612	D	$527,589	4.13
Passenger	6,116,603	I	965,205	18.74
Mail	530,998	I	7,956	1 52
Express	490,847	I	90,815	22.70

The increase in earnings from express matter carried, although actually a small sum compared with the other traffic items, is seen to have been very large in percentage. The total tons of freight carried were 7,366,637, the decrease having been 9.95. The ton miles were 1,460,551,031, and the decrease 3.44 per cent.; the average haul having increased from 184.89 to 198.27. The receipts on each ton, therefore, were greater than in the preceding year; but the average ton mile rate fell from 0.845 cent to 0.839. The freight receipts per train mile were $1.32 as compared with $1.29 in the preceding year.

The total passengers carried were 22,897,476, and the increase was 29.63 per cent. The passenger miles were 317,711,176, the increase being 23.27 per cent. In the case of this road, the average journey declined, contrary to the experience of all the other great companies, so far as we know. In the year now reported, the passenger journey was 13.88 miles and in the preceding year 14.59. Of course this difference is due to the great accumulation of short distance travel at the Chicago end. Naturally, the rate per passenger mile shows a small decrease; namely, from 1.999 cents to 1.925. It is interesting to compare the passenger journey with that of the other Chicago roads, the reports of which have been published. The average passenger journey of the United States in 1893 by Poor's Manual was 24.24 miles. In the year ending June 30, 1894, it was 27.76 miles for the Chicago & Northwestern; 42.56 for the Chicago, Milwaukee & St. Paul; 56.5 for the Wabash, and 76.64 for the Louisville, New Albany & Chicago. For the whole country the journey increased slightly and for these four roads considerably. The earnings of the Illinois Central per passenger train mile were $1.05 as compared with 97½ cents in the year before.

The new arrangements with the Michigan Central are briefly told. The land owned jointly with that company, on which the old passenger station in Chicago stood, has been divided, the Illinois Central acquiring the sole ownership of the part next the city and parting with its half interest in the ground lying to the eastward, and the land acquired is used for a downtown passenger station. Privileges in the new passenger yard and station at Twelfth street have been rented to the Michigan Central for $105,000 a year and a share of the expenses.

The purchase of the Chesapeake, Ohio & Southwestern is said to have been made in order to get an outlet north for the business brought into Memphis over the lines of the Illinois Central and over the Yazoo & Mississippi Valley, as well as a connection between Memphis and the main line of the Chicago, St. Louis & New Orleans (Illinois Central) at Fulton, Ky. The low prices of railroad properties which prevailed last autumn made the time favorable for the purchase of the Chesapeake, Ohio & Southwestern and certain affiliated properties, and the purchase was accordingly made, carrying with it valuable terminals in Memphis, Louisville and Evansville. The securities and properties thus purchased were sold to the Louisville & Nashville, a contract being made with the latter company for a perpetual lease to the Illinois Central of equal rights with itself to the use of that portion of the railroad extending from Fulton, Ky., to Memphis. The carrying out of this contract has been delayed by a suit brought by the State of Kentucky, the lower court holding that the charter of the Louisville & Nashville does not authorize it to acquire the Chesapeake, Ohio & Southwestern. The case has been appealed and if the transaction is permitted, the Illinois Central will, besides its running rights over the line between Fulton and Memphis, gain a certain annual income from the difference between 4 per cent., which it has to pay, and 5 per cent., which it will receive from the Louisville & Nashville on five millions or more of bonds passed in the transaction. If the bargain with the Louisville & Nashville is broken, the company will still have acquired a valuable feeder and connection to the East and, in either event, the immediate connection between Memphis and the North is assured.

An astute general manager of our acquaintance once said, speaking of a lot of people—a number large enough to be referred to as "the public,"—who were aggrieved at some action of the railroad company, "only give them a level headed leader and they will get about what they want." This was true in that case, and it is true generally, at least so far that it is a good fact to remember. And it is truer, perhaps, in a thousand-dollar matter than in one involving a million, for the public is persistent and the railroad manager is more likely to sacrifice a principle for the sake of avoiding a troublesome contest. This point is illustrated by an item in a recent Boston paper to the effect that the Boston & Albany has made a passage for foot passengers beneath the four main tracks at Allston, to take the place of a bridge over the

tracks which was built for the same purpose several years ago, but which the people will not use because it is so high (or the ascent is so steep). Evidently the people by persistency have got what they wanted in the first place, the easiest possible means of crossing the tracks, consistent with safety. In a thousand things the public is persistent in demanding more of a railroad than can rightfully be granted, but this matter of crossings at stations is one in which people are not likely to be unreasonable. They can constantly see just how far they are being burdened unnecessarily, and their demand for a change is therefore likely to be more persistent than in some other things. At Allston the footway is, we believe, not for passengers crossing from the station to take trains, as all of the trains stopping there run on one or the other of the two tracks nearest the station, but chiefly as a cut-off from a somewhat circuitous route by the street bridge.

Where the floor of a station building is at the level of the rails the only reasonable foot crossing (except at grade) is beneath the tracks. The difference between the height of the tallest man and that of the tallest locomotive (or car) will probably never be any less than it is now, and the subterranean passage will therefore always be much easier to get out of than the bridge is to get up to. Where the station floor is several feet higher than the track platform, an over bridge is more tolerable, because the ascent to it may be broken into two stages, and where a large portion of the passengers use this way to go to or from a street on the higher level the disadvantage is still less noticeable; but for passengers who must start from the track level and return to the same level on the other side, there is no way of disguising the lift. The only alternative in providing for them, if there are many of them, is to either make the subway or let them cross at grade. At large stations it is often better to do the latter, and tame the iron horses accordingly.

It is again proposed that Chicago be made a way station, or what is worse, that the railroads rearrange things so that it will be on a branch, like Philadelphia; but, strange to say, we hear no remonstrance from the Board of Trade or the Freight Bureau, or, in fact, from anybody. It must be that these chronic remonstrants care nothing for their city except where there is revenue at stake. The present proposition is to send the fast mail from the east to Burlington, Omaha and beyond by the Indiana, Illinois & Iowa Railroad, which, it is said, would save some three or four hours. Slow trains already evade Chicago whenever they can; now to have the fast trains take the same course will be a severe blow to the theory—held at many other places besides Chicago—that a particular city is necessary to the proper conduct of certain traffic. But the transfer of mail bags doesn't pay anything to any one in Chicago, except a few laborers or switchmen, and so the city's glory is neglected and the I., I. & I. will probably find no hindrance except from the railroads which now carry this mail through Chicago. The I., I. & I. could take the mail from the Lake Shore at La Porte and deliver it to the Atchison at Streator; and the latter could take it to the Burlington at Galesburg. But the line has very little passenger traffic, and the main question for the Government to settle will be that concerning the facilities of such a road for running fast trains with regular punctuality. The Lake Shore and the Burlington seem to make a somewhat roundabout route from La Porte to Galesburg, but the distance, according to the *Official Guide*, is only a trifle more than over the I., I. & I., so that the saving must be made chiefly in the time taken for transferring from one road to another. Moreover, the roads now carrying the mails have double tracks and other facilities that it would be difficult for a single track freight road to furnish; and as the fast trains will have to continue running to and from Chicago in any event, they can afford to haul an extra car or two very cheaply, rather than let the new applicant take the business away from them.

The Interstate Commerce Commission has issued an order prescribing regulations for the making up of freight and passenger tariffs in accordance with the decision reached after the conferences between the commissioners and railroad traffic men, which were held at Washington last February and March and were reported in the *Railroad Gazette* of March 23. As stated at that time the essence of the decision is that all tariffs, especially joint tariffs, and all corrections and supplements, must be made with care and precision, and show distinctly the names of all the roads over which they are effective. Whenever a road allows a second road to issue tariffs over its line the first road must promptly send to the commission a certificate accepting responsibility for the tariff. In connection with the order now sent out, the Commission sends a copy of the pamphlet issued December 1, 1891, containing Auditor McCain's report on the defects found in tariffs filed with the Commission at and before that time. Most of our readers are, doubtless, familiar with this report. At any rate, we know that all traffic men, high or low, are thoroughly familiar with the faults enumerated by Mr. McCain, and we shall therefore refrain from burdening them with any statement of its 15 pages at this time. The immediate question is, how far the railroads can improve their practices. Probably every one is perfectly willing to correct all deficiencies so far as possible, but the task is a hard one. The Commission evidently recognizes this very fully, and, therefore, lays down few rigid rules.

Notwithstanding the great interest in narrow gage railroads manifested in Europe about 1873, comparatively few were built; but of late years though there has been less talk there has been more done. France is getting a considerable system of such roads, and Germany has built several. In the railroad statistics of the German Empire for the year 1892–93 there are reports from 34 such roads, in operation, measuring in the aggregate 489 miles, which is 3 per cent. of the whole railroad system. They had cost on the average $21,136 a mile. In Alsace-Lorraine, where they were cheapest, they had cost only $10,500 a mile; in Saxony, where they were dearest, $29,000. One line in Alsace cost but $4,670 a mile, and one Saxon line $43,000. The speed permitted on them varies from 5 to 18½ miles an hour. Their earnings are generally light, averaging $1,920 a mile gross; but some have much larger earnings. The most profitable one is one of the costliest. On the average their net earnings were 2.19 per cent. of their cost in 1892, and 2.3 in 1891. The sharpest curve is 6 ft. radius, on a spur to a blast furnace. About one-third of the whole mileage is built on the highways. There is a station on the average to every 1¼ miles of track. One-seventh of all the railroads in Alsace are of narrow gage, one-eighth in Saxony, and one-fourteenth in Baden; but only a very small proportion in the other German countries.

A significant article on the steel rail trade appears in the *Iron Age* of the 20th. The opinion expressed is that the trade is on the eve of important improvements and that new factors will have to be taken into account next year. The Youngstown mill, now nearing completion, may enter the rail trade whenever there is a sufficient difference between billets and rails; and there is the possibility of foreign rails being imported on the Gulf and the Pacific coast. The six great mills, however, may be able to hold their whole territory in spite of any rivals. One has made important improvements in plant; another has secured a source of supply of cheap raw material; a third has the advantage of a lower duty on foreign ore; and a fourth is extremely aggressive in its management. There is a widespread opinion that lower prices for rails would help the billet market by increasing the consumption, and with present prices of raw materials the rail mills could afford to sell at lower prices than those ruling if they had a larger tonnage. But the financial condition of the railroads is such that the prospect of a tonnage up to anywhere near the capacity of the mills, is not bright.

The Russian authorities have decided to make a study of a railroad route from Perm, west by north to Kotlas, intended largely to give an outlet by the River Dwina to Archangel for Western Siberia. Perm itself is on the River Kama, on the 58th parallel, about 900 miles east by north from Moscow and something like a hundred miles west of the Ural Range, with which it is connected by rail. The route would pass through a territory of fine forests, with no outlet by rail or river, and if Arctic Archangel were an easily accessible port, there would be little doubt of the value of the line. One of the reasons given for undertaking it is to prevent the flooding of Central and Western Russia and the Baltic ports with grain from Western Siberia; but why the flood should be less disastrous if the grain is exported by Archangel does not appear; the price in Russia, except in districts inaccessible to transportation, being determined by the foreign demand, as in this country, where the Kansas or Minnesota farmer feels the competition of the wheat shipped from San Francisco or Portland quite as much as if it were shipped from New York.

Last week the *Financial Chronicle* published its summing up of net earnings for the month of July, saying "it is pleasing to reflect that with that month we close a chapter which will always be known as the most unfavorable in the railroad and industrial history of the country." Certainly we hope so, for the losses were colossal. The decrease in gross earnings for the seven months ending with July 31 were considerably over $60,000,000, and the decrease in net was $19,647,000. For the month of July the decrease in net earnings amounted to $2,563,000 or 17.18 per cent. These figures, however, do not include the Atchison, which would have made the falling off much heavier. In June, when likewise the Atchison was not included, the decrease was 27.92 per cent. in net, and in May, including the Atchison, it was 33.79 per cent. Certainly for August and September the returns of net earnings will show a very different condition, and we will all hope with the *Chronicle* that it will never again be so bad.

NEW PUBLICATIONS.

Carrying Passengers in England.—In *Scribner's Magazine* for October appears an article by H. G. Prout, editor of the *Railroad Gazette*, entitled "Railroad Travel in England and America." The article being written for a popular audience, will, necessarily, seem elementary to the experienced railroad man, and lacks the sort of specific information for which he is assumed to be always hungry. Nevertheless, there are some particulars in the article which will perhaps interest him. For instance, he may be interested, and very likely surprised, to see that the author concludes, after such analysis as he has been able to make, that passenger fares are actually considerably less on the English railroads than on those of the United States. We assume that the author of the article puts forward this analysis somewhat experimentally, and that he would like to have it torn to pieces by any American or Englishman who can demonstrate that the conclusions reached are wrong. Truth is mighty and will prevail, but it is sometimes pretty slow in prevailing.

Journal of the Association of Engineering Societies.—Although the July issue of the *Journal* has been out some time we have failed to mention the very important paper which it contains. The whole issue is given up to this paper, except the space occupied by the proceedings and various regular departments. The paper spoken of is entitled the Hydro-Geology of the Upper Mississippi Valley and of some of the Adjoining Territory, and is by Mr. Daniel W. Mead, member of the Western Society of Engineers. It contains elaborate tables of rainfall in the Upper Mississippi and West Lake Michigan valleys and the precipitation for each month and each year at Chicago for 20 years. Then follows a discussion of the ultimate disposal of rainfall under the heads of evaporation, absorption by vegetation, flow of streams, and percolation. This is accompanied by tables of drainage area, rainfall and discharge for great regions. Then follows a description of the geology of the region which is illustrated by nine colored plates and two plates in black and white. Elaborate tables are given of physical data of artesian and deep wells, also of the sources of water supply of cities and towns of 5,000 or more inhabitants and analyses of Lake Michigan water and various river waters, as well as water from wells and springs. We should suppose that the paper must be one of great value to students of this special subject.

A Hand-book of the United States Tariff; containing the Act of 1894, with complete schedules. Also an explanation of Customs Requirements and the Laws and Regulations regarding Drawback Rates, with a List of Articles on which Drawbacks have been established. New York and Philadelphia: F. B. Vandegrift & Co.

The compilers of this digest have endeavored to give a complete list of commercial articles by trade names, basing their schedules largely on decisions of the Courts and the Department. It is believed by them that the work makes the most compact and reliable authority on the subjects treated that has been compiled. The first chapter gives general rules covering the importation of merchandise, with a list of custom's districts and ports of entry. The Tariff Act of 1894 follows in full. The schedules of duties are given at length, occupying 280 pages, each item having a direct reference to the paragraph of the Act by which it is affected; and we would suggest that the user of the book would do well to look back at the paragraph, for there are certainly some errors in the schedule. For instance, we find the duty on rails is given as $\frac{7}{20}$ cent. per lb. on one page and $\frac{7}{10}$ on another, and $\frac{7}{12}$ on still another. We are assured that these errors are being corrected in a new edition. The volume ends with the customs administrative Act of 1890. The New York address of the publishers is 27 William street; the Philadelphia address 50 South Fourth street.

Manchester Ship Canal.

Considering the great difficulties under which the traffic of the Manchester Ship Canal has been carried on, the results of the past half year cannot be considered bad. The outlook for the ordinary shareholders is still gloomy, and with the enormous additions to capital made from time to time, a distribution on the shares is a matter of many years. The expenditure on capital account for the six months, after deducting proceeds of sales of plant and land, was £301,518, making a total expenditure of £14,649,410. The receipts from canal traffic were £40,123, which has been derived from 261,000 tons of sea-going and 109,000 tons of barge traffic.

The efforts for the development of the traffic are being vigorously pushed forward. The Directors report that the protracted negotiations with the railway companies for the working of the railway traffic to and from the ship canal have resulted in arrangements which, though not yet completed in all details, will, ere long, it is believed, give the port of Manchester the full benefit of its geographical position. All that has been asked for is fair and equal treatment compared with other ports, and this seems likely to be obtained without recourse to the Railway Commissioners. Meanwhile the company is gradually issuing through rates, inclusive of ship canal toll and wharfage, for all kinds of merchandise to all towns, rates which traders will find to their advantage and which should lead to a large trade.

On the question of the pollution of the canal, the Board remarks that there is no doubt that much has been done during the past few years to remedy the evil, but at present the condition of the water in the canal is a reproach to the local authorities of the entire water-shed, and involves the company in continued serious expense in dredging to maintain the depth. The Directors are assured that, in a short time, the whole of the sewage in Manchester will be prevented from entering the canal, but they are concerned by the prospect of continued heavy deposits from Salford and other districts.

Sir E. Leader Williams, the Chief Engineer, in his report states that the dredging of the canal to the full depth of 26 ft. has been actively carried on, and will soon be complete. The dock sheds that were in progress early in the year have all been completed. Three additional large three-story sheds are now being erected, and will be completed this year. Notwithstanding the fact that nearly all the steamers using the canal have not previously navigated a similar channel, the trade has been carried on in a satisfactory manner, steamers using the canal regularly by day and night. The hydraulic machinery at the docks, swing aqueduct, bridges, and locks continue to work in a satisfactory manner.—*Transport.*

TECHNICAL.

Manufacturing and Business.

L. & E. Trump, of Jersey Shore, Pa., who manufacture balance valves for the American Valve Co., shipped a consignment of valves to the Glasgow Locomotive Works, Glasgow, Scotland, Sept. 15.

The City and Suburban Railroad Co., of Baltimore, Md., is building an extensive power station on Dungan's Wharf in that city, which will be fitted with hoisting and conveying machinery of the C. W. Hunt Company's manufacture.

The National Switch & Signal Co. has recently completed a plant at East Superior, Wis., to protect the crossing of the Northwestern Coal Railway and the Chicago, St. Paul, Minneapolis & Omaha.

The Bloomsburg Car Mfg. Co., of Bloomsburg, Pa., filed a charter at Harrisburg, Pa., with a capital stock placed at $200,000. The directors are John K. Lockard, George M. Lockard, Richard W. Oswald, Bloomsburg, Pa. This action does not seem to be any more than a change of name. The company was formerly the Bloomsburg Car Co.

John K. Lockard is President and Richard B. Angeld Treasurer. Grant Herring and William P. Meigs are among the incorporators.

The Morgan Engineering Co., Alliance, O., reports that the Fulton Iron Works Co., of St. Louis, have placed an order for a 40,000 lb. lifting capacity overhead traveling crane, all motions of which will be operated by electric motors. The order for this crane was placed after a most careful investigation of all types. It is for serving the new erecting shop to be erected in connection with their plant.

The Consolidated Car Heating Company, Albany, N. Y., advertise some recent specialties, among which is a cock body packed with vulcanized asbestos in dove-tailed U grooves. Another is a renewable bushing cock, packed with a moulded asbestos lining, which completely surrounds the plug and is prevented from turning in the body by ridges which fit in the grooves.

The Goodwin Car Co. of Des Moines, Ia., has been incorporated to manufacture cars and railroad supplies. John M. Goodwin is President and H. T. Tate is Secretary, both of Chicago.

The American Safety Gate Co., of Chicago, has been incorporated in Illinois by Clyde R. Bates, Robert L. Carey and Harry K. Allen.

The order which the Electric Selector & Signal Co. has received from the Baltimore & Ohio is for instruments for 20 offices. They will be placed at stations between Baltimore and Pittsburgh. At places where the station agent has no assistant in the office and has to be in the freight house a considerable part of the time, a call bell will be placed in the freight house so that he can respond promptly to the calls of the despatcher without neglecting his freight work.

Iron and Steel.

Last Saturday the Pennsylvania Steel Co. paid out $81,000 in wages to its 3,500 employees for work done the first two weeks of September. This is the largest pay roll the company has had for months. Every department is in operation, with prospects for a steady run all winter. The rapid rise of the stock is attracting attention. Within the past two weeks the stock has gone up from 5 to 16¾.

B. M. Jones & Co., the agents in the United States for R. Mushet' steels, announce a reduction in price through the operation of the new tariff law of 46 cents per lb. on Mushet's special steel and of 19 cents per lb. on the Titantic steel brand.

The Edgar Thomson Steel Works have increased the working-time of the forces from five days a week to full time.

New Stations and Shops.

The Wheeling & Elm Grove Railroad, of Wheeling. W. Va., has prepared plans for a large new station in connection with which there will be complete repair shops. The station will be three stories high, of brick, and located at the corner of Sixteenth and Eoff streets, in Wheeling.

Interlocking.

The Johnson Railroad Signal Co., Rahway, N. J., has recently completed an interlocking plant of 24 levers for the Philadelphia & Reading at Huntingdon street, Philadelphia, one at Scranton, on the Delaware & Hudson of 12 levers, and one at Kinder, Ill., at the crossing of the M. I. & St. L. with the Wabash, C. C. C. & St. L., and the Chicago & Alton, requiring a 68-lever machine.

The New Station at Syracuse, N. Y.

James Stewart & Co., of St. Louis, have placed an order with the Pittsburgh Bridge Co., for the steel roof trusses of the new station at Syracuse, N. Y.

Tenders for Rails.

The Department of Railways & Canals, Ottawa, Ont., will receive tenders until Oct. 16 for supplying the following amounts of rails for the Canadian Government railroads: 1,000 tons of 50-lb. steel rails, to be delivered c. i. f. on the Prince Edward Island Railroad wharf at Summerside, Prince Edward Island; 300 tons of 56-lb. steel rails, to be delivered c. i. f. on the Intercolonial Railway wharf at Richmond (Halifax), Nova Scotia, and 3,000 tons of 67-lb. steel rails, to be delivered on the Intercolonial Railroad wharf at Levis, opposite Quebec.

The New Delaware River Bridge.

The Secretary of War has this week formally approved the plans submitted to him by Chief Engineer Brown, of the Pennsylvania Railroad, for the proposed bridge across the Delaware River from Philadelphia to Camden, N. J. It is understood to be the intention of the Pennsylvania railroad officers to go ahead immediately with the work of erection. The bridge will cross the Delaware River at a point about one-fourth mile east from the Pennsylvania Railroad at Frankford Junction. Connecting tracks will be built on both the Pennsylvania and New Jersey sides. On the Pennsylvania side more than half a dozen crossings of streets and railroad tracks must be made above grade. It was originally intended to have the spans about 500 ft., but as the foundations will have to be sunk to a greater depth than was anticipated the length of the spans will exceed this figure. The draw span will be 300 ft.

New York Canals.

The following is the substance of amendments to the New York Constitution recently passed by the Constitutional Convention. On the first the vote was 98 to 24.

The Legislature shall not sell, lease, or otherwise dispose of the Erie Canal, the Oswego Canal, the Champlain Canal, the Cayuga and Seneca Canal, or the Black River Canal, but they shall remain the property of the State and under its management forever. The prohibition of lease, sale, or other disposition herein contained shall not apply to the canal known as the Main and Hamburg Street Canal.

On the following the vote was 98 to 44:

No tolls shall hereafter be imposed on persons or property transported on the canals, but all boats navigating the canals, and the owners and masters thereof, shall be subject to such laws and regulations as have been or may hereafter be enacted concerning the navigation of the canals. The Legislature shall annually, by equitable taxes, make provision for the expenses of the superintendency and repairs of the canals.

The canals of the State may be improved in such manner as the Legislature shall provide by law. A debt may be authorized for that purpose in the mode prescribed by section 8 of this article, or the cost of such improvement may be defrayed by the appropriation of funds from the State Treasury or by equitable annual tax.

THE SCRAP HEAP.

Notes.

All of the bridges which were destroyed during the forest fires in Northern Wisconsin and Minnesota have been rebuilt and traffic has been resumed on the several roads.

A plan is being talked of in Pittsburg for building an elevated single track loop through the business portion of the city and compelling the surface street railroads to remove their tracks from the busy down town streets and use the elevated loop.

According to the press dispatches, the Baltimore & Ohio defied the Sheriff at Mt. Sterling, O., the other day. To enforce payment of a judgment of $500 against the company the Sheriff chained the engine of a passenger train to the track, but after communicating with headquarters the train was started, snapping the chain and leaving the Sheriff behind.

The westbound through express train of the Atchison, Topeka & Santa Fe was stopped by robbers near Gorin, Mo., on the morning of Sept. 18, but there was a large force of armed men on the train, the company having got wind of the intended raid, and the robbers were driven off, though not until after they had shot the engineman. Two of the robbers have been captured, both of them being wounded, and their statements lead to the suspicion that the detective who gave information to the railroad company helped to plan the raid. The attack on the robbers seems to have been poorly planned.

The fire at the dock of the Pacific Coast Elevator Co., in Portland, Or., on Sept. 23, destroyed property to the value of $1,000,000, including 200 freight cars, 80 of which were loaded, and a large number of cars containing costly electrical machinery. The Oregon Railway & Navigation Co.'s dock, containing 1,500 tons of wool and other freight, was destroyed, and also a steamboat valued at $45,000. The total insurance was about $500,000. The elevator destroyed will be immediately rebuilt. Three men lost their lives in the fire.

The Union Pacific has taken a train load of live stock from Ogden, Utah, to Kansas City in 83 hours, of which 20 hours was allowed for feeding the animals. The Rio Grande Western lately ran a stock train from Ogden to Grand Junction, 328 miles, in 14½ hours.

The steamship Northwest made her last trip this week, arriving at Buffalo on the 25th. The forest fires have interfered with traffic in Minnesota so that the vessel is taken off sooner than had been intended. It is said that her net receipts for the season have been $40,000, which is $10,000 more than the interest on her cost. The vessel made 16 trips and carried 8,300 passengers in the season.

A fire at New Orleans on Sept. 23 damaged the freight house and other property of the New Orleans & Northeastern to the extent of $20,000. Valuable records were burned up.

At Sausalito, Cal., on the 20th, a steamer of the North Pacific Coast Railroad Co. crashed into the slip at the wharf, doing damage to the amount of $20,000. It is said that it was impossible to stop the engines of the boat in consequence of the breaking of a hooker-on lever.

Incendiaries burned the plant of the Erie (Pa.) Car Co. Sept. 24. Loss about $250,000. The insurance amounts to about $50,000.

At Los Angeles, Cal., on Sept. 24, Judge Ross, in the Federal Court, sentenced Gallagher and Buchanan, A. R. U. strikers, to 18 months' imprisonment and to pay a fine of $5,000 each. The men were among those who attempted to intimidate non-union men on the Southern Pacific in the late strike. At Butte, Mont., Judge Knowles found H. B. Calderhead and five others guilty of contempt of court, interference with the movement of mails and interstate commerce on the Union Pacific, and sentenced them to imprisonment for 30 days and to pay a fine of $100 each.

LOCOMOTIVE BUILDING.

The Illinois Central has ordered eight passenger locomotives from the Brooks Locomotive Works and ten freight locomotives from the Rogers Locomotive Works.

The New York & New England has contracted with the Rhode Island Locomotive Works for rebuilding 15 locomotives. Vice-President Odell has been astonished to see that this contract has been so twisted that he is reported to have contracted for 100 locomotives and for the rebuilding of 105 more. Mr. Odell wishes to disclaim that any such decided boom as this would indicate has struck the New England Road.

CAR BUILDING.

Various reports have been printed the last week or two in regard to a new order said to have been given by the Long Island to the Pullman Car Co. for new passenger cars, the number being reported as 22. We are assured that there is no foundation for this report. This particular report probably originated from the fact that the Pullman Company during the early part of this month delivered the last of the cars on the order for 55, which was awarded some months ago. The delivery of the cars had been delayed by the strike.

The Youngstown Car Co. has received an order from the Pittsburg & Lake Erie for 50 coke cars which will have the Simmons drop door.

The cars ordered by the Cleveland, Cincinnati, Chicago & St. Louis from the Barney & Smith Mfg. Co., of Dayton, O., are 32 in number instead of 44 as reported last week, and consist of 20 first class day coaches and 12 combination cars. All will be fitted with the Pintsch light and the coaches will have the Scarrit No. 52 seat. The coaches will be 72 ft. long, vestibuled and finished in cherry and provided with the best equipment throughout

The Hale & Kilburn Mfg. Co. obtained the order for seats for the 55 cars of the West Side Metropolitan Elevated Railroad Co.

BRIDGE BUILDING.

Baltimore, Md.—Proposals were opened at the City Hall last week to build a bridge on North Monroe street over the Baltimore & Potomac and the Western Maryland Railroads. The city is to pay 48 per cent. of the cost and the Baltimore & Potomac Railroad Co. 52 per cent. The estimated cost is $26,000, and the appropriation for the city's share is $12,700. The bids were as follows: Jones, Pollard & Co., $19,700; Youngstown Bridge Co., $19,994; Campbell-Zell Co., $21,858.65; Penn Bridge Co., $22,927; Andrew Brown, $23,764; Pennsylvania Steel Co., $23,925. The bridge will be of steel, 200 ft. long, in two spans, and 66 ft. wide.

Proposals for the construction of Columbia avenue bridge over Gwynn's falls were opened last week. The Youngstown Bridge Co. was awarded the contract for $16,279. Other bidders were: Jones, Pollard & Co., $16,800; Campbell & Zell Co. $16,987; Pennsylvania Steel Co., $17,735; Penn Bridge Co., $17,984; Andrew Brown, $19,940.80. The new bridge will be of steel, and will take the place of the existing bridge, which is said to be in bad condition.

Mr. Nelson Perin, President of the City & Suburban Railroad Co., has submitted to the County Commissioners a plan prepared by F. H. Smith, consulting engineer of that railroad, for a viaduct over the tracks of the Northern Central, the Philadelphia, Wilmington & Baltimore, and Baltimore & Ohio Railroads, near Eastern avenue and Eighth street. President Perin offers on behalf of his company to pay one-quarter of the cost of this structure, and the Pennsylvania agrees to pay another quarter. The total cost will be about $75,000. The County Commissioners have not yet announced any decision as to whether they will agree to pay the other half of the cost of the bridge.

Buffalo, N. Y.—Contracts for 11 new steel bridges were awarded last week by the Western New York & Pennsylvania, the Union Bridge Co. getting three, the Pencoyd Bridge Works, of Philadelphia, five, and the Buffalo Bridge Works three. The total amount of the contracts is about $25,000, exclusive of about $10,000 for masonry, etc.

Chicago, Ill.—Several conferences have been held between the members of the Drainage Board and the officials of the Atchison, Topeka & Santa Fé, relative to the erection of a bridge at the crossing of the drainage channel by the railroad near Western avenue. The road has a number of tracks at that point, which will necessitate the erection of a costly bridge or reducing the number of tracks to four.

Cottage Grove, Conn.—The Philadelphia, Reading & New England has recently prepared plans for building an iron bridge over the creek at this point; bids have been received, and the contract let to James McGraw. The company's new bridge over Shekimico Creek at Silvernails, N. Y., has just been completed.

Easton, Pa.—Commissioners have been appointed to report upon the advisability of erecting a county bridge over Raub's Creek, at the place where the public road from Raubsville to Riegelsville crosses in Williams township.

Letonia, Pa.—Proposals have been invited for the construction of a new iron bridge across Cedar Run at this place, to take the place of the present structure, which is unsafe.

Montreal, Can.—The designs for the new iron bridge over the Grand Trunk Railway at Mountain street have just been completed by S. Howard, C. E., acting under the direction of Mr. P. W. St. George, City Surveyor. The designs are for a bridge from near St. Antonine street to near Notre Dame street. Its total length is 720 ft., with cut granite piers at either end. The bridge has five spans, the longest being 100 ft.

Scranton, Pa.—Mayor Connell has signed the ordinance providing for the construction of the Linden street and the Roaring Brook bridges. The plans have been turned over to Benjamin Larue, engineer. Until he re-

ports, the city clerk will be unable to advertise for proposals.

Select Council has passed the ordinance providing for a viaduct across the Delaware, Lackawanna & Western tracks from Ninth street to a point near the Lackawanna avenue bridge, and appropriating $10,000 for that purpose.

Toledo, O.—Petitions have been presented to Mayor Major asking for the submission at the coming election of a proposition to issue bonds for building another bridge across the Maumee River, in accordance with a bill passed by the State Legislature at its last session. An issue of $200,000 of bonds will be necessary to pay for the structure.

Councils have referred back the report of the committee approving the plans of the Massillon Bridge Co. for the proposed structure over Swan Creek at St. Clair street, and recommending the letting of the contract to that company at its bid of $25,000.

Washington, D. C.—The Executive Committee of the South Washington Bridge Association, which proposes building a bridge from South Capital street to Giesboro, over the Eastern Branch, had a hearing before the District Commissioners, who endorsed the bridge bill proposed by the Association. Judge H. H. Blackburn and Simon Wolfe are the chief movers in the enterprise.

Williamsport, Pa.—The County Commissioners advertised last week for proposals for the construction of a Pratt truss steel bridge over the Susquehanna River at Maynard street, to replace the structure destroyed by the flood last May. Bids were opened on Sept. 24. The bridge will be over 500 ft. long.

Williamsport, Pa.—On September 24, the County Commissioners opened bids for the construction of the Maynard street bridge, a Pratt truss. The bids are as follows: Berlin Bridge Co., $26,615; Columbus Bridge Co., $23,575; Bracket Bridge Co., $22,500; Massillon Bridge Co., $21,000; Horseheads Bridge Co., $22,500; King Bridge Co., $24,000; Groton Bridge Co., $19,975; Nelson & Buchanan, $25,400; Owego Bridge Co., $19,999. The bids for the truss bridge over the log basin were as follows: Berlin Bridge Co., $16,525; Bracket Bridge Co., $14,000; Horseheads Bridge Co., $16,000; King Bridge Co., $12,500; Groton Bridge Co., $9,990; Nelson & Buchanan, $13,866; Oswego Bridge Co., $10,000. No contracts have as yet been awarded.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Maine Central, quarterly, $1.50 per share, payable Oct. 1.

Norfolk & Southern, quarterly, 1 per cent., payable Oct. 10.

Utica & Black River, semi-annual, 3½ per cent., payable Sept. 30.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Calgary & Edmonton, annual, Montreal, Canada, Oct. 3.
Carolina Central, annual, Wilmington, N. C., Oct. 4.
Chesapeake & Ohio, annual, Richmond, Va., Oct. 23.
Denver & Rio Grande, annual, Denver, Oct. 3.
Illinois Central, annual, Chicago, Ill., Oct. 17.
Lake Erie & Western, annual, Peoria, Ill., Oct. 3.
Northern Pacific, annual, Mills Bldg., New York City, Oct. 18.
Piedmont & Cumberland, annual, Baltimore, Md., Oct. 9.
St. Louis & San Francisco, annual, St. Louis, Mo. Oct. 23.
St. Louis Southwestern, annual, St. Louis, Oct. 2.
St. Paul & Duluth, annual, St. Paul, Oct. 11.
Southern, Richmond, Va., Oct. 2, to vote on a proposal to execute a mortgage for $120,000,000.
West Virginia Central & Pittsburgh, annual, Baltimore, Md., Oct. 9.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Railway Association* will hold its fall meeting at the Hotel Brunswick, New York, on Oct. 17.

The *American International Association of Railway Superintendents of Bridges and Buildings* will hold its annual meeting in Kansas City, Mo., beginning Oct. 16.

The *Western Railway Club* will hold its first fall meeting at the Y. M. C. A. Building, La Salle Street, Chicago, Oct. 18, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the fourth Wednesday of January, March, April, September and October, at 10 a. m. At the October meeting Mr. Morford's paper on "Terminal Yards" will be the opening subject for discussion.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station, on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Wednesday in each month, at 8 p. m. The headquarters of the society are at 51 Lakeside Building, Chicago.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday in each month, at 8 p. m.

Brotherhood of Locomotive Firemen.

The annual meeting of this brotherhood was concluded at Harrisburg, Pa., on September 19. The insurance feature of the beneficiary department was changed so that every member is required to insure for at least $500. The convention adopted resolutions denouncing the action of members who struck through sympathy with the Pullman strikers; declaring against the position of Vice-Grand Master Hanrahan in the Pullman strike in advising members not to work with non-union men; and pledging loyalty to the rules of the brotherhood. The salary of the Vice-Grand Master was reduced from $3,500 to $2,500, and the sum of $12,000 was voted for the relief of firemen who struck on the Lehigh Valley, and who are still idle. The following officers were elected, Mr. Sargent being re-elected without opposition: Grand Master, Frank P. Sargent, Terre Haute, Ind.; Vice Grand Masters, J. J. Hanrahan, Charles A. Wilson and Charles W. Maier; Secretary, Frank W. Arnold, Terre Haute; Editor and Manager of the "Firemen's Magazine," W. S. Corter, Taylor, Texas.

Traveling Passenger Agents' Association.

The Traveling Passenger Agents' Association of the United States and Canada, held its annual session at Detroit last week. F. E. May was chosen President; A. G. Shearman, Vice-President; John Larrabee, of Cincinnati, Secretary. Dallas was selected as the next meeting place.

The Western Railroad Club.

The second annual banquet of the Western Railway Club took place at the Union League Club in Chicago on the evening of September 18. The talk of the evening was opened by Mr. William Forsyth, the retiring President, who urged a more general participation in club discussions. The interchange of proceedings with other railroad clubs, he looked upon as a sort of railroad university extension, the papers and discussions of the various clubs being disseminated among the master mechanics and foremen throughout the country. Concerning the matter of government control of railroads, Mr. Forsyth expressed the belief that whatever might be its advantages from a legal or a transportation standpoint, it would not result advantageously from a mechanical standpoint, that the superiority claimed for American rolling stock and equipment would never have been attained without competition between the various roads, and the competition between the master mechanics and others on the same road.

Mr. Forsyth concluded his remarks by introducing Mr. George Gibbs, the new President of the club, who expressed his appreciation of the honor conferred upon him and reverted to the early history of the club, the papers presented and their gradual improvement in number and scope, and to the general influence of the club as an association. He referred to the action of the club on the question of axles for 60,000-pound cars on boiler designs, steam heating, automatic couplers and various other subjects.

Mr. G. W. Rhodes, speaking of the "Lessons of the Strike," said: "The events in the industrial world during the first half of the year have caused many to pause and consider whether the great demand of the day is not for less of freedom and more of laws and enforcement of laws so necessary in all great and growing countries. The frequency with which trains have been held up, robbed and taken possession of, and the unheard-of position of too many of those elected to fill offices of trust and authority, have combined to pave the way and encourage the late outrages in our immediate vicinity. We believe few will dispute this. We will not stop here to detail how a change in this condition of affairs may be brought about. May not something, however, be learned in the management of the armies of men necessary for the operation of our great railways? We are, of course, aware that military and commercial service are two entirely different problems, but the military idea of a careful selection in the first place, and secondly what practically amounts to a forfeit should the service be terminated before a given period, are matters which I believe can be made advantageous to employer and employee in commercial service."

Mr. J. N. Barr on the "Influences of Railway Clubs" spoke of the advantages to be derived from a connection with such associations, and mentioned their influence in teaching one to think and talk freely and fluently, and to look at all sides of a question before reaching conclusions, also of the fact that by reason of the frequent meetings of these clubs one gains confidence in those with whom he has often to transact business.

Mr. W. F. Merrill, General Manager of the Burlington; Professor Goss, of Purdue University; Mr. A. M. Waitt, of the Lake Shore; Mr. Merle Middleton, Mr. D. L. Barnes, Mr. John McKenzie, Mr. Willard A. Smith, and Mr. Leo Canman, of the *Chicago Times*, were the other speakers.

American Society of Railroad Superintendents.

Secretary C. H. Hammond has issued the notice for the twenty-fourth meeting of the society, which will be held at Hotel Brunswick, New York City, on Monday, October 15, at 10.30 a. m.

The Society will be favored with an address by Mr. Willard A. Smith, of Chicago, on Railway Education. The principal business will be: Election of vice-presidents and two members of executive committee; reports of committees on roadway, D. B. McCoy, Chairman; on machinery, J. F. Divine, Chairman; on transportation, F. K. Huger, Chairman, and on signaling, W. G. Wattson, Chairman. These will be followed by discussion of the following topics:

(*a*) Is there sufficient reason for discontinuing the use of white or clear light as a safety signal in American railway practice? If so, what color can be substituted to mean "safety," and what to mean "caution?"

(*b*) What principles are to be recommended for fixed signals, especially for block-signals and interlocking, that will promote uniformity in installation, simplicity in operation and clearness in signification?

(*c*) Is the use of derailing switches in terminal yards to be recommended?

(*d*) What principles and methods have been found, in your experience, most effective, in order to obtain trained, reliable and loyal employees in the operating department?

(*e*) Experience in the application of the Standard Code of Train Rules in cases of doubt or difficulty.

(*f*) Special instances of economy in the handling of freight service.

It is hoped that members will prepare themselves to discuss the topics, or to read short papers upon them. All railroad superintendents to be present are invited.

The office of Secretary Hammond is now at 32 Liberty street, New York City.

American Street Railway Association.

The thirteenth annual meeting will be held in Machinery Hall, Piedmont Park, Atlanta, Ga., commencing at 10 o'clock a. m., Wednesday, Oct. 17, and lasting three days. Among the papers to be read and discussed are the following: "A Standard Form for Street Railway Accidents;" "Can the T Rail be Satisfactorily Used in Paved Streets?" "City and Suburban Electric Railways;" "Mail, Express and Freight Service on Street Railway Cars;" "Standards for Electric Street Railways;" "Street Car Wheels and Axles;" "The Best Method of Treating Accidents and Complaints;" "The T Rail Construction of the Terre Haute Street Railway Co.;" "Transfers and Commutation;" "A Practical System of Long Distance Electric Railway Work;" "Brake Shoes;" "Destructive Arcing of 500-Volt Fuses;" "Power Brakes vs. Hand Brakes," and "Taxation." The exhibits will be in the same building, and applications for spaceshould be made to Mr. N. W. L. Brown, of the Atlanta Consolidated Street Railway Co.

PERSONAL.

—Mr. A. Gray, Chief Clerk in the freight department of the Great Northern, has been appointed Assistant General Freight Agent of the same company, with headquarters at St. Paul.

—Mr. J. A. Weed, for nearly three years Superintendent of Bridges and Buildings of the Oregon Railway & Navigation Co., has resigned. Mr. Weed formerly held a similar position on the Wyoming division.

—Mr. Carlton W. Paris, Central Passenger Agent of the Cleveland, Cincinnati, Chicago & St. Louis will retire from the service of that road on October 1.

—Mr. D. Davies has been appointed Assistant General Passenger Agent of the Great Northern at St. Paul. Mr. Davies has been auditor of passenger receipts.

—Mr. George O. Somers, Assistant General Freight Agent of the Great Northern, has been appointed General Freight Agent of the company.

—Mr. Samuel E. Williams, who died of apoplexy at Princeton, Ind., on Sept. 20, was the first Superintendent of the Louisville, Evansville & St. Louis Railroad.

—Mr. Thomas H. Riley has resigned as Superintendent of the St. Louis, Kansas City & Colorado road, and the duties of the office will be assumed by Mr. E. O. Faulkner, as manager, auditor and treasurer of the road.

—Mr. J. R. Peachy has been appointed Assistant General Freight Agent of the Illinois Central's Northern and Western lines, with headquarters in Chicago. He succeeds Mr. F. B. Bowes, who has been transferred to New Orleans.

—Mr. Howard F. Parke, formerly Division Superintendent of the Missouri Pacific at Sedalia, Mo., has been appointed Superintendent of Transportation for the Union Pacific, Denver & Gulf Road, with headquarters in Denver.

—Mr. Courtenay De Kalb has been appointed Professor of Mining and Metallurgy in the University of Missouri, that college of the University being at Rolla, Mo. Mr. De Kalb is widely known as a mining engineer and as a writer on scientific and economic subjects.

—Mr. Robert Moore, of St. Louis, Mo., is making an examination of the lines of the Atchison, Topeka & Santa Fe Railroad for the General Reorganization Commitee of that company, with a view to reporting upon the physical condition of the road.

—Mr. Theodore Nickerson, who held the position of General Purchasing Agent for the Mexican Central for several years, died suddenly at Boston, September 12. He was 45 years of age. His father, Mr. Thomas Nickerson, who died two years ago, was the first president of the company.

—Captain G. J. Grammer of Evansville, Assistant General Manager of the Chesapeake, Ohio & Southwestern Railroad, has accepted the appointment of General Freight Agent of the Lake Shore & Michigan Southern road, with headquarters at Cleveland. He will probably assume office about Oct. 1.

—Colonel A. M. Harrison, of Fort Worth, Tex., died at Eureka Springs, Ark., on Sept. 16. Colonel Harrison was President of a national bank at Fort Worth, Tex., and prominent in mercantile and banking circles in that city. He was one of the organizers of the East Line & Red River Railroad and became President of the company.

—Mr. Henry Sanford, President of the Adams Express Co., last week tendered his resignation as President of the company. Mr. L. C. Weir, one of the managers, was elected his successor, and assumed the duties of president at once. Mr. Sanford took the presidency after the retirement of the late John Hoey, with no intention, as was understood at the time, of retaining it permanently. He is one of the heaviest stockholders.

—Mr. S. L. Lewis, Superintendent of the San Luis Potosi division of the Central Mexican Railroad, has resigned that position on account of ill health. Mr. R. E. Thomas will probably succeed him. Mr. Lewis has been Division Superintendent of the Mexican Central since 1887 and before that he was a conductor on this railroad. For some time before taking charge of the San Luis Potosi division he was Superintendent of Transportation of the company.

—General George L. Becker, the senior member of the Minnesota Railroad and Warehouse Commission, has been nominated as the Democratic candidate for Governor of that State. General Becker has been a member of the Commission since its organization and in the early days as president of the St. Paul & Pacific, which is now a part of the Great Northern system. As General Becker's term as Commissioner will expire on Jan. 1, 1895, it is not likely that Governor Nelson will accept his resignation although it was tendered him several days ago.

—Mr. S. T. Crapo was recently elected General Manager of the Flint & Pere Marquette Railroad, by the directors of that company. Has held the office of Acting General Manager for several months since the resignation of Mr. W. J. Baldwin, Jr., in June, to become Vice-President of the Southern Railway Co. Mr. Crapo is a son of Hon. W. W. Crapo of Boston, President of the railroad company, and is now about 30 years old. He was formerly assistant to the General Manager. No other changes are expected to be made. Mr. W. F. Potter will continue to act as General Superintendent.

—Mr. John Scott has been appointed Comptroller to the Receivers of the Northern Pacific, and as such will have full charge of the treasury and auditing departments of the receivership. The receivers have abolished the offices of general auditor and secretary to the receivers. Other changes are contemplated in the same line of economy and directness of management, including, possibly, the removal of the executive offices of the receivership to St. Paul. Mr. Scott has had a large and practical experience, as treasurer, auditor, and president of corporations. These changes will necessitate the retirement from their present offices of Secretary James B. Williams, Treasurer George S. Baxter, and General Auditor J. A. Barker. Comptroller Scott was employed by the general reorganization company some time ago as an expert accountant in conjunction with Mr. Stephen Little.

—Mr. George C. Smith, formerly with the Missouri Pacific, was last week elected President and General

Manager of the Atlanta & West Point Railroad at the company's annual meeting. His election to these offices had been anticipated as he had been previously elected to similar positions on the Western Railway of Alabama, which controls the Atlanta & West Point. These offices have been separate heretofore. Mr. C. H. Phinizy, President of the Georgia Railroad & Banking Co., one of the Central of Georgia's properties, has been President of the West Point Railroad since 1888, and has held that office with the Western of Alabama only one year less. Captain Tyler has been General Manager of both railroads since 1889. Before that he was with the Central of Georgia as General Superintendent of Transportation. These changes are now effected through a stock vote of the Central of Georgia cast by Receiver H. M. Comer.

—Mr. Edward B. Leisenring, President of the Lehigh Coal & Navigation Co., died at Homburg, Germany, on Sept. 20. He had been in ill health for several months. In August he sailed for Germany, but the journey enfeebled him. Mr. E. B. Leisenring was a native of Mauch Chunk, the eldest son of the late Hon. John Leisenring, who was during his lifetime prominently identified with the development of the Lehigh Coal & Navigation Co. He began his business life with this company, and two years ago was elected its president to succeed Joseph S. Harris, who resigned to become one of the receivers of the Reading Railroad Co. Mr. Leisenring's leading business operations were in the mining of coal, although he was also extensively engaged in the iron, slate and lumber industries in several States. Mr. Leisenring was closely connected with a dozen anthracite coal mining firms in the Lehigh region in Pennsylvania, president of many of them, a director in the Bethlehem Iron Co. and in the Chapman and Bangor Slate Companies, and in a number of manufacturing companies.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fé.—F. B. McKercher has resigned his position as Chief Clerk to General Superintendent H. U. Mudge, and will be succeeded by A. S. Rankin, who has been for some time in charge of the time card department of the work at the general offices at Topeka, Kan. Mr. McKercher has held the position for three years. He has accepted a posiiton on the Mexican Central Road.

Baltimore & Ohio.—Robert B. Ways has been appointed Foreign Freight Agent of the railroad to succeed T. H. Stafford, resigned.

Baltimore & Ohio Southwestern.—T. C. Wells, District Passenger Agent at St. Louis has resigned, and is succeeded by W. P. Townsend, Traveling Passenger Agent, at Vincennes, Ind. The appointment will take effect October 1.

Buffalo, Rochester & Pittsburg.—The headquarters of the General Superintendent, which have been located at Buffalo, N. Y., are to be removed to Rochester, N. Y., where the headquarters of all the other officers of the operating and traffic departments have been located for some years. The offices of the present Superintendent, Mr. R. G. Matthews, have been at Buffalo since his appointment, and the offices of Mr. J. H. Barrett, the former General Superintendent, were also at Buffalo during the last years that he held that office, but they were for a time at Rochester.

Chicago, Milwaukee & St. Paul.—The annual meeting was held in Milwaukee, Wis., on September 22, and the following directors were elected: Philip D. Armour, Chicago; August Belmont, Frank S. Bond, Charles D. Dickey, Jr., Peter Geddes, New York; Frederick Layton, Milwaukee; Joseph Milbank, New York; Roswell Miller, Chicago; James M. McKinlay, William Rockefeller, Samuel Spencer, A. Van Santvoord and J. Hood Wright, New York. The following officers were elected: Roswell Miller, President; F. S Bond, First Vice-President; E. P. Ripley, Third Vice-President; F. G. Ranney, Treasurer, and P. M. Myers, Secretary.

Chicago, Paducah & Memphis.—The following appointments have been announced on this road, which was formally opened for traffic on September 25: B. F. Johnson, General Manager; T. K. Jenkins, Auditor, St. Elmo, Ill.; C. B. McCall, General Freight and Passenger Agent; C. Hallagan, Jr., Trainmaster, with headquarters at Mt. Vernon, Ill.

Cleveland, Cincinnati, Chicago & St. Louis.—Charles Krotzenberger, formerly connected with the Cincinnati, Hamilton & Dayton, has been appointed Central Passenger Agent of this company.

Cleveland, Cincinnati, Chicago & St. Louis.—W. S. Moore has been appointed Engineer of Maintenance of Way of the Michigan Division.

Connecticut River.—At the annual meeting in Springfield, Mass., September 19, the old Board of Directors was re-elected as follows: J. Mulligan, of Springfield; Oscar Edwards, of Northampton; William Whiting, of Holyoke; J. H. Albin, of Concord, N. H.; J. H. Williams, of Bellows Falls; George H. Ball, of Boston; Person G. Cheney, of Manchester, N. H.; Seth M. Richards, of Newport, N. H.; J. W. Stevens, of Greenfield, and Edmund P. Kendrick of Springfield.

Duluth, South Shore & Atlantic.—E. W. McPherran has been appointed land commissioner with headquarters at Marquette, Mich.

Great Northern.—George O. Somers, Assistant General Freight Agent, has been appointed General Freight Agent. D. Davies, auditor of passenger receipts, has been appointed Assistant General Passenger Agent. A. Gray has been appointed Assistant General Freight Agent.

Louisville, New Albany & Chicago.—Frank R. Lawrence and E. K. Sibley, of New York, and H. H. Campbell of Boston, have been re-elected Directors of the railroad.

New York & New Jersey Bridge Co.—The annual meeting of the stockholders was held on Sept. 20 in the company's office, No. 214 Broadway, New York. The following Directors were elected: John B. Kerr, Louis Windmuller, Charles A. Smylie, Frederick Potter, William Bell, William H. Ely, Lorenzo Duncan, of New York; John Loughran and Charles H. Swan, of Brooklyn; Daniel N. Lockwood, Buffalo, N. Y.; Gen. James S. Clarkson, Des Moines, Ia.; John S. Runnells, Chicago, Ill.; and John C. Adams, President Gas Co., Newburgh, N. Y. Mr. Runnells is general counsel of the Pullman Palace Car Co.

Providence & Stonington S. S. Co.—At the annual meeting of the company at Providence, R. I., on September 19th, the following were elected directors for the ensuing year: Samuel D. Babcock, New York City; George Macculloch Miller, New York City, Edward P. Taft, Providence, R. I.; John D. Riker, New York City; Jacob W. Miller, New York City; George G. Haven, New York City; Nathan F. Dixon, Westerly, R. I.; Charles P. Clark, New Haven, Conn.; Henry F. Lippitt, Providence, R. I.

Queen & Crescent.—B. B. White, Roadmaster of the Southern Railway in Kentucky, has resigned to accept a similar position with this company at Lexington, Ky. He will be succeeded by T. E. Evans.

South Jersey.—William A. Christian, who was recently Supervisor of the Philadelphia & Reading Railroad, is now Superintendent of this railroad in New Jersey.

Tehuantepec National.—Mr. Edward Boder has been appointed General Traffic Agent of this road with headquarters at Coatzacoalcos, Mex., the Atlantic terminus of the road.

Terre Haute & Indianapolis.—R. B. Woolsey has resigned as Superintendent of Telegraph of the Vandalia Line, and will, it is stated, be succeeded by Mr. W. Ray.

Toledo & Ohio Central.—T. D. Dale, Treasurer and General Manager, has been appointed Receiver in place of E. Summerfield. He will continue as General Manager, with headquarters Marietta, Ohio. W.M. Morse, has been appointed Superintendent, with headquarter at Marietta, in place of J. V. Parker, previously Superintendent and Traffic Manager.

Vandalia.—O. J. Gibbons, Superintendent of the Vandalia, will remove his headquarters from Terre Haute to the Union Station, St. Louis.

RAILROAD CONSTRUCTION.

Incorporations, Surveys. etc.

Arkansas Southern.—Construction work is going on on this road on an extension from Cargile, Ark., south to the Louisiana State line, a distance of about 12 miles. About 8 miles has already been completed by the contractor, T. M. Dodson of Cargile.

Baltimore & Drum Point.—A party of capitalists including George J. Humphrey, of New York; William J. Pefford, of Minneapolis; N. J. Payne, a civil engineer, of Chicago; Frank R. Beidler, of Baltimore, and Benjamin Watkins, of Anne Arundel County, made a trip over the route last week. Mr. Beidler, who controls the line and its franchises, says that he is assured of sufficient capital for investment in the enterprise to complete the road at an early date.

Baltimore & Ohio.—David Lee, Superintendent of maintenance of way for the Baltimore & Ohio road, at Zanesville, O., says the branch of that road from Lodi, on the Akron & Chicago Junction division, south to Millersburg, will be built and in operation within 90 days.

Bangor & Aroostook.—The bridge at Monticello, Me., has been so far completed as to allow trains to pass over it. The laying of rails on to Presque Isle has been resumed and there is nothing further to delay the work except the failure of the rails to arrive from the West as fast as they can be used. The track laying will hardly be continued beyond Presque Isle this year.

Bellaire, Zanesville & Cincinnati.—The work of changing this road from a narrow gage to standard gage is well under way. All the bridges and trestles along the nine miles of the road purchased last year from Muskingum County, O., have been repaired, and along nearly the entire line the ties are in place for the standard gage track. The trestles and bridges along the eastern end of the road are now being changed, and the road will probably be ready for the new rolling stock by early spring.

Big Lawree & Panther Creek.—The Secretary of State of West Virginia has issued a charter to this company to build a railroad from the mouth of Cherry River, Nichols County, to the headwaters of Panther Creek, Greenbrier County. Of the capital stock $50,000 is subscribed. The stock is held by W. G. Gartner, O. C. Gartner, J. M. Boyer, of Selins Grove, Pa.; J. L. Miller, of Sunbury, Pa., and Thomas Carson, of Alexandria, Va.

Carson & Colorado.—An elaborate story was told in the press dispatches last week in regard to an extension of this line across barren mountain lands to Mojave, Cal. President D. O. Mills, as was to be expected, denies that such an extension of the road has been decided upon or is in contemplation. The development of the country along the present line has been very slow. It has always been the intention to extend the road whenever the conditions would warrant it. When the road was built surveys were made to Mojave. The condition of business just now certainly does not encourage the immediate extension of the road.

Chester, Perryville, Ste. Genevieve & Farmington.—This road, which has been under construction for five months, reached Perryville, Mo., on September 15. The part completed extends; from Chester, Ill., through St. Mary's in Ste. Genevieve County, to Perryville, a distance of about 20 miles, and will connect the coal fields of Illinois with the lead and mineral regions of Missouri.

Chicago, Paducah & Memphis.—This road was formally opened on September 25 from Mt. Vernon to Marion, Ill., about 40 miles. The railroad is to extend from St. Elmo, about 50 miles north of Mt. Vernon, Ill., to the Ohio River, opposite Paducah, Ky. W. L. Huse, of St. Louis, Mo., is President.

Clearfield, Conemaugh & Western.—At a meeting of the Board of Directors in Harrisburg, Pa., September 20, Chief Engineer Samuel Brugger submitted his report of the final survey of about 35 miles of the 75-mile route. The line adopted begins at the Clearfield Bridge, at the mouth of Little Clearfield Creek, connecting with the Beech Creek Road, and extends in a southerly and southwesterly direction, following the creek and passing through the towns of Madera, Belsena, Glen Hope, Iroona and Coalport. At the latter point the line leaves the creek and follows a branch for a distance of 10 miles, when it penetrates the mountains to the point where the survey breaks off. No contract was let at this meeting, but the Directors will make one at an early date. The survey of the balance of the line will be completed before long. S. J. M. McConnell, of Harrisburg, is President.

Columbus, Hocking Valley & Athens.—There are four parties of engineers out surveying this line from Columbus to Athens, O., a distance of about 70 miles. The injunction suits brought some weeks ago to prevent the company from occupying the canal bed are still pending in the courts at Columbus, and unless specially assigned for trial will not come up for a year. But it is reasonably certain that the cases will be disposed of in about a month.

Corsicana & Southeastern.—Colonel C. W. Coykendall has recently returned to Corsica, Tex., from a trip to New York City. He states that he was able to complete a satisfactory agreement which will enable him to go ahead with the construction work of the railroad without delay. He states also that he has placed orders for the rails at the Pueblo mills. This road is projected to extend from Corsicana southeast through the town of Buffalo to Fairfield, Tex., a total distance of about 100 miles.

Ebensburg & Black Lick.—This branch line of the Pennsylvania was completed to Vintondale, Pa., the new coal mining town and the present terminus, this week. Coal shipments will soon begin, the tipple having been completed and the coal cars being on hand. The evening train on the Ebensburg & Cresson will run through to Vintondale and lay there over night. Seldersville is the name of a new town laid out

Fort Plain & Richfield Springs.—This New York company has filed with the Secretary of State at Albany a certificate showing that it has increased its capital stock from $300,000 to $600,000. The capital paid in amounted to $32,800, and there are no debts or liabilities. The increase in capital was approved by the State Railroad Commission. This is an old project to connect Fort Plain and Richfield Springs, N. Y.

Grass Creek Terminal Co.—A company has been formed in Utah to build a railroad from the Grass Creek Junction of the Echo & Park City Railroad, in Summitt County, up Grass Creek canyon to coal mines in Summit County, a distance of six miles. It is estimated that the cost of construction and of purchasing the right of way will be $120,000. The surveyors are now at work, and they expect to be able to secure a 2 per cent. grade. The directors are: Wilford Woodruff, George Q. Cannon, Joseph F. Smith, William W. Cluff and James Jack. George Q. Cannon is President; Joseph F. Smith Vice-President, and Arthur Winter, Secretary and Treasurer.

Great Northern.—President Hill announces that the company has no intention of extending the Fosston branch across the Mesaba iron range to Duluth as has been stated in the daily papers. He says this line will not be extended for the present, and no work on it is likely to be done next year.

Gulf, Colorado & Santa Fe.—The item in the *Railroad Gazette*, last week, page 657, under this heading, referred to the Gulf, Beaumont & Kansas City Railroad, a line buiding in Eastern Texas to reach timber property and stone quarries in Jasper County.

Hinton & New River.—The plans of this road are being pushed to rapid completion, and it is probable that the project will be in shape for beginning construction early in the spring. Engineers are in the field, and others are completing the drawings and making estimates upon which bids are to be based. The road is of considerable local importance, and the money to build it will be raised in large part by local people. It will be 20 miles long from Hinton W. Va., to connect with the Norfolk & Western.

Manchester & Northern.—The contract secured by L. J. Highland, of Chicago, for a railroad from Manchester to Winchester, O., and reported last week on page 657 under the heading of "New Roads," is to be built by a company of the above name. It is controlled by the firm of Heald & Halliday, with D. E. Heald, of Manchester, O., Purchasing Agent, and Charles R. Diman, Chief Engineer. Work on the road is to be commenced in October and the construction is to be finished in 90 days. The railroad will be 25 miles long from Manchester, on the Ohio River, north through Adams County, touching the towns of Bentonville and West Union, to Winchester on the Cincinnati, Portsmouth & Virginia Railroad. Mr. L. J. Highland, the contractor, has his office at 1,436 Monadnock Block, Chicago. The general offices of the railroad are at the Arcade, Cleveland, O. The Frazier-Highland Construction & Equipment Co. will supply the equipment for the railroad.

Mexican Railroads.—The concession held by Jose Valenzuela for the construction of a railroad from Ciudad Porfirio Diaz, in the State of Coahuila, to Monterey, has been declared void, owing to the failure to commence work within the stipulated time.

An extension of time for the completion of the lines covered by the concession to H. E. Dennie and S. Marshall has been granted. This concession, granted in 1890, is for the construction of a railroad from the Mexican National between Morelia and Patzcuaro, traversing the districts of Patzcuaro, Tacambaro, Uruapam, Ario and Apatzingan, in the State of Michoacan.

Mexico, Cuernavaca & Pacific.—The work on this road is steadily progressing. Rails have been laid to kilometre 68, from the City of Mexico, which brings the road to the vicinity of the town of Cuernavaca. The freight traffic is increasing rapidly, particularly in sugar, rice, grains, flour, etc., and an additional daily freight train has become necessary. For the wood traffic alone, a long daily train runs from kilometre 68 to the City of Mexico. The passenger traffic has developed greatly between Mexico City and Cuernavaca, and trips from Mexico to Cuernavaca are made in less than five hours, instead of ten hours as formerly.

Midland Terminal.—President Collbran has closed contracts with Clough & Davidson, of Denver, to extend this branch of the Colorado Midland into the Cripple Creek camp. Construction is to begin at once and trains are to be running into Victor within 30 days, and into Cripple Creek by December 1. There are 14½ miles of track to be laid to connect the Colorado Midland with Cripple Creek. The present terminus of the branch line is Gillett, Col.

Middlesex Valley.—The formal opening of the Naples extension of this railroad took place on Sept. 19. The line is about eight miles long from Geneva northwest to Naples, N. Y.

Montgomery, Hayneville & Camden.—Nothing has been done with this project for over a year, since the first section of 10 miles out of Camden, Ala., was graded, but President S. D. Bloch, of Camden, in now arranging to complete the track laying on the graded section and also hopes to place under contract the entire road as far as Montgomery, which will be about 60 miles.

Nakusp & Slocan.—Track laying on this branch of the Canadian Pacific in British Columbia, which has been delayed for want of material, was resmed last week. It is expected that the road will reach Three Forks, B. C., by October. The Dominion Government has accepted 20 miles of the road, and will pay over to the company the subsidy granted.

New Roads.—The people of Farmerville, La., have appointed various committees to promote the construction of a railroad from that town to a connection with the Missouri Pacific near Junction City, at the Arkansas State line, the distance being 27 miles. The town of Farmerville will give a 5 mill tax and a bonus in cash and lands along the railroad route to any company which will construct the railroad. The committee, of which J. D. Everett, Farmerville, is chairman, desires to correspond with contractors or others who may be prepared to undertake the construction of this railroad.

The railroad referred to last week under this head, of which S. S. Chisholm and C. B. Houghton,

now of Roanoke, Va., are projectors, is to be located in Giles County, Va., not Giles County, Ga., as the item stated.

Nova Scotia Southern.—Monroe, Strang, Lee & Co., general railroad contractors, of 15 Wall street, New York, are fitting out two steamers at Baltimore to convey a contractors' outfit and construction material to Yarmouth, Nova Scotia, for the purpose of commencing work on the South Shore Railroad from Yarmouth to Shelburne.

Panther Creek.—The Secretary of State of West Virginia, has issued a certificate of incorporation to this railroad company. The company is capitalized at $2,000,000, and will build a railroad beginning at the mouth of Cherry River, where it connects with the Chesapeake & Ohio, following Big Laurel Creek and Panther Creek to Camden-on-Gauley. The road will be a connecting link between the Camden system and the Chesapeake & Ohio and will pass through an undeveloped coal and iron field from which the forests have not been cut. The incorporators are W. J. Garner and J. M. Boyer, of Salines Grove, W. Va.; Thomas E. Carson, of Alexandria, Va., and John L. Mills, of Sunbury, Pa.

Petersburg Belt.—Work on the Belt line being built around Petersburg, Va., for the Atlantic Coast Line is rapidly approaching completion. It is expected to have the road finished by the latter part of next December.

Pecos Valley.—The northern extension of this company, building north of Eddy, N. M., to which the trains have been running for some time has been completed for 53 miles. This portion of the extension has been accepted by the company from the contractors and is now in operation. The entire extension through to Roswell, N. M., which will be the northern terminus, will be finished and ready for operation by Oct. 10. The road has been in operation for nearly two years from Pecos City, Tex., northwest along the Pecos River to Eddy, N. M., 90 miles. The line when operated to Roswell, will be 164 miles long. The road will be nearly a straight line for the entire length through to Roswell, N. M. It is built with low grades and passes through irrigated property, the railroad company being controlled by the land company, which owns the irrigated lands. The officers of the company are as follows: J. J. Hagerman, President, Colorado Springs, Col.; C. B. Eddy, Vice-President, Eddy, N. M; Percy Hagerman, Treasurer; Arthur S. Goetz, Secretary, Colorado Springs; Jeff N. Miller, General Manager; Murray Harris, Chief Engineer; W. I. Church, General Freight and Passenger Agent, Eddy, N. M.

Quebec Central.—Thomas Ridout, government engineer of railways for the Dominion of Canada, and L. A. Vallee, inspector for the Province of Quebec, on September 20, accompanied by E. Berryman, Chief Engineer of the Quebec Central, and Mr. Lukes, one of the contractors, inspected the first 20 miles of the new Tring and Megantic branch of the Quebec Central, now being constructed by Holt & Lukes, of Montreal.

Quincy Quarry.—The short railroad to the quarries at Quincy, Mass., built by the Quincy Quarry Co. has been turned over to the New York, New Haven & Hartford Railroad for operation. The railroad was described in this column in a recent issue. The length of the main line built is only two miles and two miles of switches connect the several quarries now in operation. Additional track will be laid as required to open up the property owned by the quarry company. This amounts to about 260 acres of quarry land, which will be leased by the company for quarry purposes. The railroad now built is all in the city of Quincy and connects the quarries with the stone-cutting sheds and gives the property a western outlet over the New Haven Railroad. D. H. McDonnell, of Quincy, Mass., is president of the company and H. T. Whitman, of Quincy, is the engineer. The road now built cost about $80,000 to build.

Rumford Falls & Rangeley Lake.—R. B. Straton has finished the survey of the railroad from Rumford to a point near Houghton's in Byron, Me. They have also made a preliminary survey beyond this point. The distance completed is 18 miles. Mr. Straton says that the road will be a fairly easy one to build. The hardest part is a ledge which crops out along the line in one place. Several cuts will be necessary through it, the deepest of which will be from 20 to 25 ft. The engineers are now making the working estimates, profile, etc. It will take about three weeks to get this work done so the grading can be let. Eli Roy, of Lewiston, Me., has the contract for the bridge across the Androscoggin River.

Salt Lake & Mercur.—The route of this railroad, building by the Mercur Mining Co., of Utah, has been changed from the east side of the canyon, where a large amount of rock work would have been necessary, to the west side, where the work can be done with scraper. The change shortens the distance a mile and a half, but in order to keep a 4 per cent. grade a loop will be built. The contractors state that the road will be ready for track laying in November. The road is to be 9 miles long, from Fairfield to the company's mines at Mercur.

Springfield, Yellville & White River.—Engineers have begun surveying this railroad between Springfield, Mo., and Harrison, Ark. The right-of-way has been guaranteed nearly the whole distance. Boon County, Ark., has voted bonuses to the company and free right-of-way. The line was surveyed once before, about two years ago, when some grading was done near Harrison. W. E. Webster, of Kansas City, Mo., was President of the company.

St. Croix & Penobscot.—Some effort is now being made to arrange for an extension of this road from its present terminus, Princeton, Me., through Washington County to the Maine Central. George P. Wescott and James Mitchell, who have done considerable railroad building in Maine, are reported to have purchased 522 shares of the 1,000 shares of the road's stock—a controlling interest. They offer to construct the extension if the city of Calais will waive its claim of $83,500. There are two routes in view, one being a distance of 23 miles from Princeton to the Maine Central; the other 30 miles.

St. Joseph Valley.—Arrangements are now being made to repair this railroad and reopen it for traffic. It has been abandoned for about a year. It is 16 miles long, extending from Buchanan to Berrien Springs, Mich., and is located in Buchanan County, the most southwestern county in Michigan. Neither of these towns are of any importance, and the chief hope for the railroad securing a paying traffic is in an extension through the county to Lake Michigan at Benton Harbor. The rebuilding is being undertaken by J. M. Caulfield, President of the Benton Harbor & Southeastern Railroad. The contract has been let to A. M. Turner for the bridge repairs and for replacing the 30 lb. rails now in the track with 60 lb. rails already delivered at Buchanan. The present work may be undertaken in anticipation of both the extension to Benton Harbor and the southern extension from Buchanan to South Bend, Ind.

St. Louis & Eastern.—It is reported that the company, which controls the Madison Coal Co., has awarded a contract to J. A. Ware, of St. Louis, to complete the gap between Marine and Alhambra, Ill., a distance of 10 miles. This work will be of considerable importance in the further development of the rich coal resources on its line. It will give a direct line from St. Louis to Mount Olive.

Utah Co.—A charter for this company was secured in Utah last week. It has been organized to control various railroad and mining properties, and real estate now owned by those prominent in the dominant party in Utah. Among the properties included in the new organization are the Salt Lake & Los Angeles Railroad, about 15 miles long from Salt Lake City to Salt Air; the Salt Air Beach Co., which owns beach property on Salt Lake; the Cullen Spring mines; the Intermountain Salt Co., and about 600 acres of coal land in Summit County. The principal stockholders are Wilford Woodruff, George Q. Cannon and Joseph Smith, who have been the chief owners of the properties now turned over to the new company. The charter is a liberal one, and gives the company authority to carry on real estate business, build and equip railroad and telephone lines, waterworks, mills, factories and to do a general contracting and financial business. James Jacks, of Salt Lake, one of the directors, states that the first work which the company will undertake will be to extend the railroad beyond Salt Lake to mining property at Coalville, a distance of about 40 miles. Messrs. George Q. Cannon and N. W. Clayton have left Salt Lake City for New York to make financial arrangements for starting this work immediately.

Wheeling & Lake Erie.—On Friday last this company secured a valuable franchise from the City of Martin's Ferry, O., for which it has been negotiating for several years. It is a right-of-way along the full water front of the town, a distance of about 5 miles, along the Ohio River. The grant was made with the consideration that the company build a wharf, pave it and erect overhead crossings where the road crosses the wharf and other streets leading to the river. The grant gives the road the right-of-way to the large iron and steel works below Martin's Ferry, from which it has been shut out. It is stipulated that work on the extension shall begin within 90 days and pushed to completion at once.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The Protective Committee has issued a circular in part as follows, explaining further its request for proxies. The old management, on the eve of a new election, has undertaken to forestall our movement and to perpetuate itself by a process of substitution. Certain directors who have been conspicuous in the recent history of the company have resigned in favor of substitutes of their own selection. If this directory, as thus constituted, should be perpetuated, the control of the property in our judgment will remain virtually in the same hands as before, and we shall have no guarantee that there will be important changes in the executive officers, financial policies or business methods. Therefore stockholders should not be satisfied with this seeming change of management. One of the most serious considerations in reference to this new board of managers is the influence it will have in the reorganization. Our committee has formulated definite plans of reorganization, but details cannot be fixed until the financial condition and earning power of the system are actually ascertained. This can only be accomplished by trustworthy examination and such examination will be more thorough and reliable if made under the direction of a new board of managers. The Protective Committee has radical purposes in view in reference to a new board of directors. We believe that the controlling elements of the recent unfortunate management of the company should be eradicated, that there should be a complete change in the financial policies and business methods of the company and the property placed in the control of men who will command the respect and confidence of the public.

Calumet & Blue Island.—The company last week executed a trust deed to the Merchants Loan & Trust Co., on which bonds are to be issued, $300,000 to retire existing indebtedness, $1,010,000 to pay existing indebtedness and to remain as security for further loans. This is one of several roads, connecting the different works of the Illinois Steel Co., the Fox pressed steel works, and other industrial points on their lines with roads running into Chicago, Milwaukee and Joliet. The other roads are the Chicago & Kenosha and the Chicago & Southeastern.

Cape Fear & Yadkin Valley.—A plan of reorganization for the company it is announced will soon be presented by the bondholders' committee. The work is pretty well outlined, and they are waiting only to ascertain what rate of interest can safely be fixed on the bonds, which will be determined by the earnings of the road while in the hands of the Receiver after a sufficiently long period of test. William H. Blackford, of Baltimore, is chairman of the committee, and Frank T. Redwood, secretary. The other members are John A. Tompkins, Basil B. Gordon, J. W. Middendorf and William H. Perot.

Carolina Central.—The bondholders have formally accepted the plan formulated by the Bondholders' Committee and the officers of the Seaboard Air Line for adjusting the interest on the first mortgage bonds. These bonds now bear six per cent. interest. This is to be reduced to four per cent for five years unless the railroad earns more than that rate. If only four per cent. is paid the bondholders will receive interest bearing income certificates for the unpaid two per cent. The Seaboard Air Line guarantees the four per cent. interest. The Carolina Central Railroad Co., however, is to spend $215,000 in the next five years on improvement of its road, rebuilding the bridge across the Pee Dee River in North Carolina, and other betterments.

Chicago & Kenosha.—This company last week executed a trust deed for $120,000 to the Merchants' Loan & Trust Co., of Chicago, to secure the issue of bonds to be used in canceling the company's present mortgage indebtedness.

Chicago & Southeastern.—This company has executed a trust deed to the Merchants' Loan & Trust Company for the sum of $270,000, security for a loan of $200,00, made for the purpose of cancelling the mortgage indebtedness of the road, the remaining $70,000 of the trust deed covering that amount of the road's indebtedness previously unsecured.

Choctaw, Oklahoma & Gulf.—Philadelphia bankers in offering for subscription $1,000,000 of the 6 per cent. bonds of this company, give in their circulars some facts of interest in regard to the financial condition and the resources of the company. This issue of bonds is a first mortgage on about 220 miles of standard gage road, exclusive of branches, in the Indian and Oklahoma Territories, of which 97 miles is now in operation, and the contracts to complete the remaining 123 miles have been let. Sixty-five miles of the road in operation lie between Wistar Junction, on the St. Louis & San Francisco, and South McAlester, on the Missouri, Kansas & Texas, and 32 miles between Fort Reno and Oklahoma City, on the Atchison, Topeka & Santa Fé Railroad. At El Reno, just east of Fort Reno, this road connects with the Texas line of the Rock Island Railroad. These bonds are also a first lien on the coal estates of the company, estimated to contain upwards of 50,000,000 tons of first-class bituminous coal, and on which there are now in operation three coal mines, with a daily capacity of 2,500 tons. The mortgage also covers equipment. A general mortgage securing $5,500,000 bonds (of which $1,000,000 are reserved to retire these prior lien bonds) has been issued and sold to complete the unfinished portion of the road. The net earnings for 1893 were $159,171; fixed charges under this issue of prior lien bonds will be $60,000. Mr. F. I. Gowen, Receiver, estimates the net earnings of the company after completion of the railroad applicable to interest charges at about $379,000. Capitalization of the company—Prior lien bonds (about $5,000 per mile), $1,000,000; general mortgage bonds, about $20,000 per mile) $4,500,000; Income 5 per cent. bonds, $1,100,000; stock, 75,000 shares, par $50, $3,750,000.

Columbus, Hocking Valley & Toledo.—The suit of the Central Trust Co., of New York, against this company, brought on behalf of the holders of 8,000,000 bonds, and to recover a judgment in that amount from Judge Stevenson Burke, the estates of Chauncey H. Andrews, Charles G. Hickox and W. J. McKinney was heard on demurrer at Columbus last week. No decision can be had for at least a month. If the demurrer, which was filed by Burke and his associates, should be sustained, it would mean that the court holds that the Ohio statutes of limitations bar the case, and the recourse of the trust company would be an appeal to the higher courts. If the demurrer is overruled, the suit would then be ready for trial on its merits. The Central Co. was represented in court by Henry Crawford, of New York; ex-Governor Foraker, of Cincinnati, and others. The defendants were represented by Judge Burke himself; Judge Sanderson, of Youngstown, O., and Judge George K. Nash and T. P. Finn, of Columbus. A suit similar to this was filed by John W. Shaw, then president of the railroad company, against the same defendants in February, 1887. In that suit Judge Evans, of the Common Pleas Court of Columbus, held on a motion to dissolve the injunction against Judge Burke selling his stock in the Toledo & Ohio Central, that the act of issuing the 8,000,000 in bonds was the creation of a continuing trust and the statute of limitations had not run against it to the extent of barring suit for recovery. These are the same questions which were argued at Columbus last week. In John W. Shaw's case, brought in 1887, after Judge Evans' decision a motion for a change of venue was allowed, and the case sent to Newark, O where it was finally agreed to submit it to a board of arbitration which subsequently sat at Saratoga, N. Y., and held in favor of Judge Burke. One of the main defenses of Judge Burke, in his argument last week, was that the matter was adjudicated by the arbitration board, and the trust company has no right of action. The Central Trust Co. claimed that its rights were not adjudicated in that arbitration because it was not a party to that suit.

Concord & Montreal—The annual report for the year ended June 30, 1894, shows the following results with comparisons with the previous year.

	1894.	1893.	Inc. or Dec.
Gross earn	$2,413,907	$2,509,948	D $96,041
Oper. expenses	1,722.227	1,885,604	D 163,377
Net earn	$691,680	$624,344	I 67,336
Fixed charges	317.441	338,712	D 11,271
Dividends	360,000	280,530	I 79,470
Surplus	$14,239	$5,102	I $9,137

The total number of passengers carried was 1,824,151; local, 1,660,940; through, 163,211. Total number carried one mile, 48,033,266. The average rate per mile for all passengers was .01959. The total tons of freight carried were 2,085,215. Of this 1,146,271 was local and 938,944 through freight. The average rate per ton per mile for all freight carried was .01374. The total train mileage was 2,534,110, of which 1,009,679 was passenger and 728,547 freight.

The equipment of the road now consists of 53 passenger, 29 freight and 23 switching locomotives; 153 cars in passenger service; 2,400 cars in freight service and 105 cars in company's service.

Galveston, Houston & Texas.—The suit brought by the District Attorney in the name of the Attorney-General of Texas to have the courts declare the 99-year lease of this property held by the International & Great Northern to have been invalidated, was heard at Wallisville, Tex., last week and the suit dismissed. An appeal will now be taken to the court of civil appeals. These proceedings were instituted at the request of the Missouri, Kansas & Texas Railroad which owns the capital stock of the above line. The International & Great Northern, which holds a lease of the railroad, has refused to make a traffic contract with the Missouri, Kansas & Texas to give that company the right to run its trains from Houston, its present terminus, to Gavleston. The litigation to secure this privilege from the International & Great Northern or by having the lease declared invalid, has been going on for about two years. It has been urged that the lease was unconstitutional because it gave the lessee the right to deny the use of the leased line's tracks to any other company. The suit was instituted in the district court at Galveston but a change of venu was obtained to Chambers County. When the case came up for trial last summer it was continued until the present time. The judge decides now that the Attorney-General alone had authority to bring the suit and that he could not delegate his right to county or district attorneys.

Iowa Central.—The annual report is for the year ending June 30. The figures follow with those for previous years:

Gross earnings:	1894.	1893.	1892.
Freight	$1,456,833	$1,546,186	$1,486,285
Passenger	294,189	336,329	340,196
Total gross	1811,567	1,942,564	1,888,260
Operating expenses	$1,198,589	$1,374,978	$1,412,770
Net expenses	612,977	567,591	475,490
Total income	627,403	581,903	489,760
Interest	$335,246	$340.125	$331,423
Rentals	48,960	50,610	50,760
All charges	448,894	451,272	*454,895
Surplus	$178,539	$161,631	$34,855

* Including $55,364 for div. on preferred.

The decrease in operating expenses of $176,383 over 1892 is explained in the following items:

Bridges and repairs	$38,465	D	$33,769
Renewal of rails	13,849	D	20,332
Payroll for engineers and firemen	124,816	D	25,117
Payroll for trainmen	87,807	D	22,204
Office salaries	56,615	D	4,489
Station agents and laborers	96,196	D	6,249
Locomotive fuel	112,453	D	19,208

Kentucky Union.—Chief Engineer J. K. Stroufe has been ordered to the Breaks of the Tug Fork of the Big Sandy River to decide upon the best route for an extension of the road, which would open the coal territory of the Sandy Valley.

Louisville, New Albany & Chicago.—At the recent annual meeting of the stockholders the issue of $1,000,000 new equipment bonds was authorized. The announcement is made that only $350,000 of the new bonds will be offered for sale at the present time. The proceeds will be used to pay off temporary loans, which were made when certain equipment now in use was purchased.

Old Colony.—The stockholders of the company, at their annual meeting, at Boston, Sept. 25, authorized the issue of $2,000,000 new bonds, payable in 50 years, interest to be paid by the lessee. President Choate said the company had no immediate use for the bonds, but as it was undertaking extensive improvements at South Boston and at the Dover street yards, and, as grade crossings at Dorchester and Brockton had to be eliminated, the Directors desired authority to issue the bonds when needed. The company was already authorized to furnish $500,000 bonds, but they have been reserevd to meet the six per cent. bonds falling due in June.

Pennsylvania, Poughkeepsie & Boston.—The sale, under foreclosure proceedings, of the railroad, which was to have taken place at Trenton, N. J., on Sept. 18, has been postponed by direction of the Federal Court, until Oct. 18, next. Such of the company's rolling stock as was subject to lien held by the Central Car Trust was sold to the Car Trust for $132,500. The property embraced a dozen locomotives, half of them not mounted on wheels; 20 passenger, mail and combination cars, 38 platform cars, 100 hopper and 349 gondola cars.

Philadelphia & Reading.—The plan of rehabilitation, which has been prepared by the Reorganization Committee, was published on Tuesday. The underwriting syndicate is to secure a commission of 2½ per cent. and the court has fixed Oct. 15 as the day for the hearing on this matter. The plan is published by a committee composed of Frederic P. Olcott, President of the Central Trust Co., Chairman; Adrian Iselin, Jr., J. Kennedy Tod, Henry Budge, Thomas Denny, of New York; George H. Earle, Jr., Sidney F. Tyler, and Samuel R. Shipley, of Philadelphia. It is in the form of a letter to the general mortgage and income bondholders, and the stockholders. The plan states that the present financial condition of the company (including the coal company), as reported by the Receivers, is as follows: The amount of Receivers' certificates, with interest to Sept. 1, is $3,676,824; floating debt, $3,900,645, and car trusts, $7,533,988. The annual fixed charges are stated at $10,477,560. It is proposed to raise, by assessments on the income bonds and stock, $10,000,000 with which to pay off the Receivers' certificates and floating debt, and pay off such equipment notes and car trusts as may not be extended. This is to be done by the issue of 5 per cent. bonds under a collateral trust mortgage to which income bondholders will be asked to subscribe at the rate of one $1,000 collateral trust bond for each $10,000 income bond, and one $1,000 collateral trust bond for each 200 shares of stock. Income bondholders and stockholders may, if they prefer, pay in cash 3 per cent. upon the par value of their holdings, for which no obligation will be given. The bonds not taken by them will then be purchased by a syndicate at 70, less 2½ per cent. commission. The committee will purchase the general mortgage coupons for five years, including those now in default upon all bonds assenting to the agreement of May 7 last in case the company shall be unable to pay the same from earnings in any year. Ten year coupon scrip secured by the purchased coupons will be issued, to be retired out of surplus earnings at 105 and accrued interest. Bondholders assenting to the May agreement will have the right to take such scrip at par for their coupons. Stock is to be transferred to the Central Trust Co. as trustee, in order to secure to the general mortgage bondholders, until the coupons thus purchased shall have been paid, the right to direct how it shall be voted for one-half of the Directors and the President of the company. Thereafter the general mortgage bondholders shall direct the vote of the stock as to one-third of the Directors, the income bondholders one-third, and the stockholders one-third of the Directors and the President. The car trust is to be so arranged that annual payments shall not exceed $500,000, or such other sum as may be satisfactory to the committee. As payments are made upon one of these car trusts the company will receive for its general purposes $1,860,000 general mortgage bonds now held as part security for such car trusts. The committee proposes to offer to settle with the Philadelphia, Reading & New England (Poughkeepsie Bridge) bondholders on terms which are not specified in the plan, and in default of acceptance of the terms offered to allow the claims of these bondholders "and the holders of other imperfectly secured or disputed claims" to remain as they now are. After readjustment under this plan the committee says that the condition of the company will be as follows: The Receivers' certificates and the floating debt will have been paid; the principal of the car trusts will have been reduced by $2,000,000, and the annual payments on the balance materially reduced. The company will be in receipt of 1,860 general mortgage bonds, and will have in its treasury about $5,000,000 third preferred income bonds, and about $3,000,000 of other assets. On the 1st of January, 1898, it will also receive $10,363,000 additional general mortgage bonds, under the terms of the mortgage securing the same. During the next three years also so much of the earnings of the company as will be applicable to the payment of interest upon the general mortgage bonds will be freed by the purchase of the coupons on those bonds by the committee, and be applicable to other purposes, in case of absolute necessity. The annual payment of the company will be materially reduced by the reduction of car trusts and the payments of the floating debt; and unless the earnings are less than last year, they will suffice to pay the interest upon the general mortgage bonds, together with the reduced car trust payments, and leave a surplus. If, on the other hand, they reach the average of the last three or five years, such surplus will be large; and it is to be remembered that during the last five years the company has distributed among the income bondholders over $8,500,000. The committee consider that this readjustment of the affairs of the company will place it in a sound position, and that the junior security holders should be given the opportunity to further that result before the general mortgage bondholders resort to foreclosure. For the sake of protecting their own interests, and in consideration of the purchase of the general mortgage coupons by the committee it is expected that they will avail themselves of that opportunity. The offer cannot, however, be held open indefinitely.

Assents of the income bondholders are required within 60 days. If at the end of 60 days a sufficient number of security holders have not signified their assent to the plan, the committee will press foreclosure proceedings to a final conclusion as rapidly as possible. Accompanying the plan is a list of the collaterals pledged in the collateral trust loan and a statement showing that they earned in 1893 $662,960, of which $558,691 was received by the Philadelphia & Reading Railroad Co.

Piedmont.—At a meeting of stockholders at Danville, Va., Sept. 18, the sale of that road, extending from Danville to Greensboro', N. C., 48 miles, to the Southern Railway Co. was confirmed, and the property formally deeded. The Piedmont, which was a Confederate War road built in 1862, has been operated as a part of the Richmond & Danville ever since 1872.

Washington & Chesapeake Beach.—Benjamin F. Karns has filed a bill in equity in Washington against Theodore W. Tyrer and the railroad company, praying for an accounting, and that Mr. Tyrer be restrained from disposing of 2,150 shares of the stock of the company now in his possession. Judge Cox granted a temporary restraining order, returnable Oct. 10.

Wisconsin Central.—The Reorganization Committee of the company has decided that the Committee should proceed in a body next week to a personal inspection of the property. In the meantime a plan of agreement will be prepared by counsel, and on the committee's return from Wisconsin it will be submitted to the security holders without delay, and if it be possible to then submit a plan of reorganization that also will be done.

Union Pacific.—The statement of the Union Pacific system for July given below, does not include the operations of the Oregon Railway & Navigation nor the Union Pacific, Denver & Gulf Roads either year. It shows a gross decrease of $433,290, and a net decrease of $218,338 for the month, each division showing diminished receipts. The statement for the month and seven months follows:

UNION PACIFIC.

July—	1894.	1893.	Dec.
Gross earnings	$1,098,125	$1,338,113	$239,988
Oper. expenses	713,991	847,211	133,219
Net earnings	$384,134	$490,902	$106,768
Since Jan. 1—			
Gross earnings	$7,663,835	$9,884,103	$2,180,268
Net earnings	2,084,714	3,537,245	1,452,531

OREGON SHORT LINE & UTAH NORTHERN.

July—			
Gross earnings	$328,446	$480.140	$151,693
Oper. expenses	259,938	295,675	35,737
Net earnings	$68,508	$184,465	$115,956
Since Jan. 1—			
Gross earnings	$2,679,353	$3.679,657	$1,000,304
Net earnings	687,687	1,392,658	704,970

GRAND TOTAL OF UNION PACIFIC SYSTEM.

Month of July—			
Gross earnings	$1,725,337	$2,158 627	$433,290
Gross expenses	1,292,327	1,507,279	214,951
Net earnings	$433,009	$651,348	$218,338
Since Jan. 1—			
Gross earnings	$12,701,700	$16,739,624	$4,037,924
Net earnings	2,852,628	5,314,916	2,462,288

TRAFFIC.

Traffic Notes.

A plan is now under consideration by the railroads of the Northwest to establish a car service (demurrage) association which shall embrace in its membership all the roads operating in Minnesota, North Dakota and South Dakota. This will be practically an extension of the Terminal Dispatch Association, which has been in existence for several years at St. Paul, Minneapolis and Minnesota Transfer. The headquarters of the new association will probably be at St. Paul. It has been a difficult matter to enforce the demurrage charges at the smaller points in these States and the railroads hope to avoid detentions at country stations by the new association, which will embrace every mile of road in the three States.

The Canadian Pacific Railroad has agreed to pay the United States tax of $1 on each immigrant brought into the country, the same as is done by the steamship companies.

The Albany Railway, running an electric street car line between Albany and Troy, now runs a freight car between those cities three times a day each way. There is a depot in each city and the company also runs wagons to call for and deliver goods.

At a meeting of the Southern Railway and Steamship Association in Atlanta, the division of the cotton shipments between competing roads at the principal points were discussed and substantial agreement was reached as regards most of the places except Atlanta, Montgomery and Rome. Pig-iron manufacturers from Pennsylvania and Alabama presented a complaint against the action of the Pennsylvania and Reading roads in raising freight on iron pipe.

The heavy movement of coal from Pittsburgh to Lake Erie ports continues unabated and the movement of coke and ore is also heavy. All the roads at Pittsburgh report a shortage of cars, though this may or may not be serious, as the shippers as well as the forces for handling the freight at the lake terminals are also working well up to their full capacity, so that it is quite possible that the movement could not be much heavier even if the supply of cars and locomotives were greater. There is a large movement of ore from Lake Superior via Erie to Eastern Pennsylvania points, where the ore is mixed with other kinds. Freight on the Erie Canal is very heavy and the boats have been getting 4 cents a bushel on wheat from Buffalo to New York. For the week ending Sept. 15 grain shipments by canal from Buffalo amounted to 2,548,726 bushels. The cotton movement in Texas is very heavy. It is estimated that the crop in that State will be 2,500,000 bales. It has been stated that the reduction in rates on cotton recently ordered by the Texas railroad commissioners will average 11 per cent. We do not, however, hear of very serious complaint on the part of the railroads, from which, perhaps, it is safe to assume that most of the large quantity now being carried goes at the special rates, which, it will be remembered, the Commission authorized to and from numerous important points, making exception to the mileage rates.

The shippers who sent two or three train loads of California fruit to England this year state that the experiment will not be tried again. The fruit had to be sold promptly on arrival and there were large fruit crops in Europe this year, so that money was lost.

The Cleveland, Cincinnati, Chicago & St. Louis announces a new fast train between St. Louis and Cleveland, to begin running Sept. 30. It will leave St. Louis at noon and arrive in Cleveland at 2.10 a. m., to connect with the New York & Chicago Limited, on the Lake Shore, which reaches New York at 6.30 p. m. On the same date train No. 9 will be restored between Cleveland and Indianapolis, leaving Cleveland at 8 p. m.

The New York, Chicago & St. Louis has resumed the running of the dining cars which were taken off after the World's Fair.

The Ohio River rose on September 21, high enough to float the coal fleets, which have been loading all summer. Pittsburg reports stated the quantity of coal ready to start as 350,000 tons or more.

Chicago Traffic Matters.

CHICAGO, Sept. 26, 1894.

Eastbound shipments continue to show a gratifying increase. Westbound merchandise is also holding up well. The Lake lines also experienced a large increase last week, as was to be expected as the close of navigation is in sight. The movement of general merchandise was especially heavy. The grain shipments by lake were: 505,158 bushels wheat, 942,197 bushels corn, 486,368 bushels oats, 21,748 barrels and 164,427 sacks flour.

Rumors are still current that eastbound grain rates are being manipulated, but the only basis apparent is the "kicking" by some of the shippers, who are unable to meet the bids made. Lake rates are firm at 1¼ and 1⅜ cents a bushel to Buffalo on corn; 1⅛ and 1¼ to Port Huron on corn. Other rates are well maintained, including an advance of 5 cents a ton on hard coal from Buffalo to Chicago.

As I predicted, the Trans-Continental conference came to nought, owing to the attitude of the Atchison, which insists that before it will join another association its differences with the Southern Pacific regarding side-trips, etc., in California, must be adjusted. A report was current last week that a conference was being held at El Paso, but the Atchison officials were not informed of it. The conference finally adjourned subject to the call of the chairman. About the only result of the meeting was to show the position of the Great Northern, which demands a differential via Portland. The Atchison will never agree to allow a differential to the northern lines on California business, claiming the right under the contract with the Southern Pacific to make any rates that are made by any line. The Burlington is also reluctant to vote on this question prior to the opening of its new line to the Pacific Coast via Billings, Mont., and the Northern Pacific.

An important conference is being held here this week between representatives of the lines connecting with the I., I. & I., and the Elgin, Joliet & Eastern. The conference grew out of the action of the Joint Committee meeting held in New York last week which endeavored to agree upon a reivison of the Trans-Mississippi River rates to the seaboard. At this meeting it developed that the situation hinged on these two roads, which really control these rates. The question of the proportions of the through rates to be allowed these lines has been the most troublesome of all the problems which have confronted the eastern lines for a long time. These lines claim that they earn all they get, as they afford their connections quick service and the short haul on this business. Judging from the reluctance of the larger roads to make any change, it would seem that they are satisfied with the arrangement, even if it does, as alleged, disturb all the other rates.

Chairman Midgley has "called down" some of the roads in his association for authorizing the protection from their Mississippi River crossings of proportional rates on imported goods via Baltimore and Philadelphia, destined to Missouri River points. The chairman calls attention to his previous ruling on the subject and to the fact that such practices have been condemned by the Interstate Commerce Commission, which ruling has been confirmed by the United States Circuit Court; and orders that the practice be at once discontinued.

The Iowa roads are not very sanguine that the railroad commissioners of that state will agree to their request for an advance in rates, as all the merchants are bitterly opposed to it. Some of the roads would undoubtedly be in favor of advancing rates any way and making a test case of it. The only thing in the way of such action is that the roads as yet are apparently not a unit in regard to such a policy.

Traffic agreements west of here are being well kept and the managers are hopeful that with maintained rates they will be able to make a better showing for September and October than for August.

The Central Traffic Association has modified its action regarding the sale of "home visitor" excursion tickets and stopped the sale of such tickets to prominent commercial centers in its territory.

The St. Paul, the Alton, the Illinois Central, the Big Four and the Lake Erie & Western all brought excursions to Chicago last Sunday. The St. Paul brought in about 5,000; the Alton, 1,200; the Big Four and Illinois Central about 2,000.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines for the week ending Sept. 22, amounted to 52,472 tons, against 51,528 tons during the preceding week, an increase of 944 tons and against 48,206 tons for the corresponding week last year. The proportions carried by each road were:

ROADS.	WEEK TO SEPT. 22.		WEEK TO SEPT. 15.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central	3,596	6.8	4,540	8.8
Wabash	4,234	8.1	4,904	9.5
Lake Shore & Mich. South.	5,660	10.8	4,397	8.5
Pitts., Ft. Wayne & Chicago.	5,674	10.8	5,883	11.4
Pitts., Cin., Chi. & St. Louis	7,969	15.2	7,078	13.7
Baltimore & Ohio	3,206	6.1	2,972	5.8
Chicago & Grand Trunk	7,011	13.4	6,801	13.2
New York, Chic. & St. Louis	6,999	13.3	6,949	13.5
Chicago & Erie	5,751	11.0	6,498	12.6
C. C. C. & St. Louis	5,372	4.5	1,501	3.0
Totals	52,472	100.0	51,528	100.0

Of the above shipments 1,649 tons were flour, 16,092 tons grain and mill stuff, 11,317 tons cured meats, 10,467 tons dressed beef, 1,279 tons butter, 2,457 tons hides, and 4,769 tons lumber. Lake lines carried 62,036 tons against 58,551 tons last week.